VOLUME I

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1952

No. 28

UNITED STATES OF AMERICA, ON THE RELATION OF OSCAR L. CHAPMAN SECRETARY OF THE INTERIOR, PETITIONER

vs.

FEDERAL POWER COMMISSION AND VIRGINIA ELECTRIC AND POWER COMPANY, ET AL.

No. 29

THE VIRGINIA REA ASSOCIATION, ET AL., PETITIONERS

vs.

THE FEDERAL POWER COMMISSION AND VIRGINIA ELECTRIC POWER COMPANY, ET AL.

ON WRITS OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

PETITION FOR CERTIORARI FILED MARCH 19, 1952
CERTIORARI GRANTED MAY 5, 1952

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PETITION FOR REVIEW OF THE UNITED STATES OF AMERICA, ON THE RELATION OF OSCAR L. CHAPMAN, SECRETARY OF THE INTERIOR

To the Honorable the United States Court of Appeals for the Fourth Circuit:

The United States of America, on the relation of Oscar L. Chapman, Secretary of the Interior (hereinafter sometimes referred to as the "Secretary"), being aggrieved by the order of the Federal Power Commission (hereinafter sometimes referred to as "the Commission") issued on January 26, 1951, granting a license to the Virginia Electric and Power Company (hereinafter sometimes referred to as "VEPCO"), hereby petitions this Court to review the said order of the Commission, and in support of this petition respectfully shows as follows:

I. JURISDICTION

The jurisdiction of this Court is invoked under section 313 (b) of the Federal Power Act (16 U. S. C., 1946 ed., sec. 825*l*). The order of the Commission was issued on January 26, 1951. Pursuant to section 313 (a) of the said Act, the Secretary filed a petition for rehearing on February 19, 1951, and the petition was denied by the Commission in an order issued on March 1, 1951.

II. THE PARTIES HEREIN

1. The Petitioner herein is the United States of America, appearing on the relation of Oscar L. Chap-

man, Secretary of the Interior. The Secretary intervened in the proceeding before the Commission in his representative capacity, that is, as the head of an executive department of the United States Government. The United States is, therefore, the real party in interest.

2. The respondent Commission is the administrative agency of the United States Government charged with the administration of the Federal Power Act (16 U. S. C., 1946 ed., secs. 791 *et seq.*). Subject to the standards and limitations provided by law, the Commission is authorized and empowered to issue licenses for hydroelectric projects, including those to be located on navigable waters of the United States.

3. The respondent Virginia Electric and Power Company is a Virginia corporation, qualified to do business and doing business as an electric public utility in the States of Virginia, West Virginia, and North Carolina. It is the real party in interest as respondent in this cause.

III. NATURE OF THE CASE

1. On October 6, 1948, VEPCO filed an application for a license to construct a hydroelectric project at Roanoke Rapids on the Roanoke River in North Carolina. On April 6, 1949, the application was amended. As amended, the application was for a project with an installed capacity of 125,000 hp. or 91,000 kw.

2. On March 22, 1949, the Commission issued an order setting the matter for hearing before an Examiner.

3. Hearings were held before the Examiner in May and June, 1949. On March 17, 1950, the Examiner issued an intermediate decision granting the Secretary's petition to intervene, but deciding all issues of fact, law, and discretion in favor of VEPCO. On motion filed by the Secretary, the hearing was reopened, and further hearings were held in June and July, 1950. On November 26, 1950, the Examiner rendered a supplemental decision, in which he reaffirmed his previous findings and conclusions.

4. Pursuant to the Commission's rules, the Secretary filed his exceptions to the Examiner's decision. VEPCO also filed exceptions to the Examiner's ruling that the Secretary should be admitted as a "party to the proceedings." Oral argument was had before the Commission on January 11, 1951. On January 26, 1951, the Commission issued its opinion and Order No. 204, sustaining the Examiner's decision on all issues and ordering the issuance of a license to VEPCO for the construction of a hydroelectric project at Roanoke Rapids.

5. On February 19, 1951, the Secretary filed his petition for rehearing. This petition was denied by an order issued on March 1, 1951.

IV. QUESTIONS PRESENTED

The following questions are presented by this petition:[1]

[1] The issues presented herein are not all the issues which were before the Commission. For the purpose of this petition, we have omitted (1) those issues which, by comparison, are less important than the issues presented herein (for example, whether VEPCO's proposed project is best adapted to navigation or recreation); (2)

A. (1) Has Congress, by section 10 of the Flood Control Act of 1944 (58 Stat. 887, 891), reserved the water resources of the Roanoke River Basin for development by the United States itself?

(2) Has Congress removed the Roanoke Rapids site from the licensing jurisdiction of the Commission?

(3) Has the Congressionally approved comprehensive plan for the development of the Roanoke River Basin been so amended or modified as to release the Roanoke Rapids site for non-Federal development?

B. (1) Has the Commission, by its letter of May 3, 1944, to the Chief of Engineers, expressed its judgment that the development of the water resources of the Roanoke River Basin should be undertaken by the United States itself?

(2) Would VEPCO's proposed project affect such development?

(3) Was the Commission prohibited by section 7 (b) of the Federal Power Act (16 U. S. C., 1946 ed., sec. 800) from approving VEPCO's application?

C. In approving the general plan for the comprehensive development of the Roanoke River Basin for flood control and allied purposes, as recommended by the Chief of Engineers, did Congress also act upon the recommendation of the Commission; and is it

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those issues the determination of which would require this court to weigh conflicting evidence (for example, whether the proposed project would have engineering feasibility); and (3) all issues relating to the question whether the Commission should now recommend that the Roanoke Rapids project be constructed by the United States.

within the limits of the Commission's discretion, by reversing its previous position, to set aside the congressional approval arrived at upon the Commission's recommendation?

D. In issuing a license for a project, is it within the limits of the Commission's discretion to surrender huge potential power assets of the United States, which assets (in the form of net power benefits) were intended to be distributed among the people in the area in accordance with the provisions of section 5 of the Flood Control Act of 1944?

E. In approving the general plan for the comprehensive development of the water resources of the Roanoke River Basin for flood control and allied purposes as recommended by the Chief of Engineers, did Congress thereby adopt his finding that "the comprehensive plan * * * provides for optimum development of the water resources of the basin"? If so, what weight should be attributed to this finding, and is it within the competency of the Commission to set aside this finding and to substitute its judgment to the effect that VEPCO's proposed project, rather than the Roanoke Rapids unit in the comprehensive plan, is "best adapted" to the comprehensive development of the Roanoke River Basin?

F. In determining whether the proposed project is "best adapted" to a comprehensive plan for water power development, as required by section 10 (a) of the Federal Power Act (16 U. S. C., 1946 ed., sec. 803), was it incumbent on the Commission to balance the application for a single project as against a river basin development?

G. Is VEPCO's proposed project economically feasible?

1. In determining the total annual costs of the proposed project, was it incumbent on the Commission to determine what part of the charges for interest, maintenance, and depreciation of Buggs Island should be assessed as headwater benefit payments under section 10 (f) of the Federal Power Act?

2. Has VEPCO sustained its burden of showing that the proposed project would be economically feasible, and what would be the result if the Commission had properly determined the annual headwater benefit payments under section 10 (f) of the Federal Power Act?

H. In determining whether a license for the construction of a hydroelectric project should be granted, was it incumbent on the Commission to find not only that the project was economically feasible, but also that the granting of such license would be in the public interest, considering the interests of the consumers? How would the interests of the consumers be affected by the construction of VEPCO's proposed project, as compared with the Federal development of the Roanoke Rapids unit in the comprehensive river basin plan approved by Congress?

V. THE FACTS

The following are the facts[2] related to the questions presented herein.

[2] Included in the facts stated herein are also the "facts of the law," that is, those propositions of law or statutory provisions which form the background for the determination of the questions presented.

A. Effect of section 10 of the Flood Control Act of 1944

1. By section 7 of the Flood Control Act of 1936 (49 Stat. 1576) and section 6 of the Flood Control Act of 1938 (52 Stat. 1215), the Secretary of War (hereinafter sometimes referred to as the Secretary of the Army) was authorized and directed to make investigations and surveys of the Roanoke, Tar, and Smith Rivers and their tributaries for flood control and power development.

Pursuant to these directives, the Corps of Engineers embarked upon a study and investigation and arrived at a comprehensive plan for a river basin development, consisting of 11 dams and reservoirs, as shown on the map included herein. The plan contemplated that this development was to be carried out by the United States with Federal funds; and that the project units were to be constructed on a step-by-step basis in a given sequence, with Buggs Island (on the Roanoke River) and Philpott (on the Smith River) as the initial step in the development, to be followed by the construction of the dams and reservoirs at Gaston and Roanoke Rapids as the next steps in the development.

On May 22, 1944, the Chief of Engineers submitted to Congress his report on the Roanoke River Basin, published as House Document 650, 78th Congress, 2d Session. He found that this comprehensive plan provided for "the optimum development of the water resources of the basin," and that "to safeguard the interests of navigation and flood control the dams and power facilities should be constructed, operated, and maintained under the direction of the Secretary of

War and supervision of the Chief of Engineers." Accordingly, he recommended that this general plan of development "be adopted as the basis for improvement, step-by-step, of Roanoke River and tributaries for flood control, navigation, and other purposes," and that the Buggs Island and Philpott units be authorized for construction "as the initial step," generally in accordance with the plans of the District Engineer and at an estimated cost of $36,140,000.

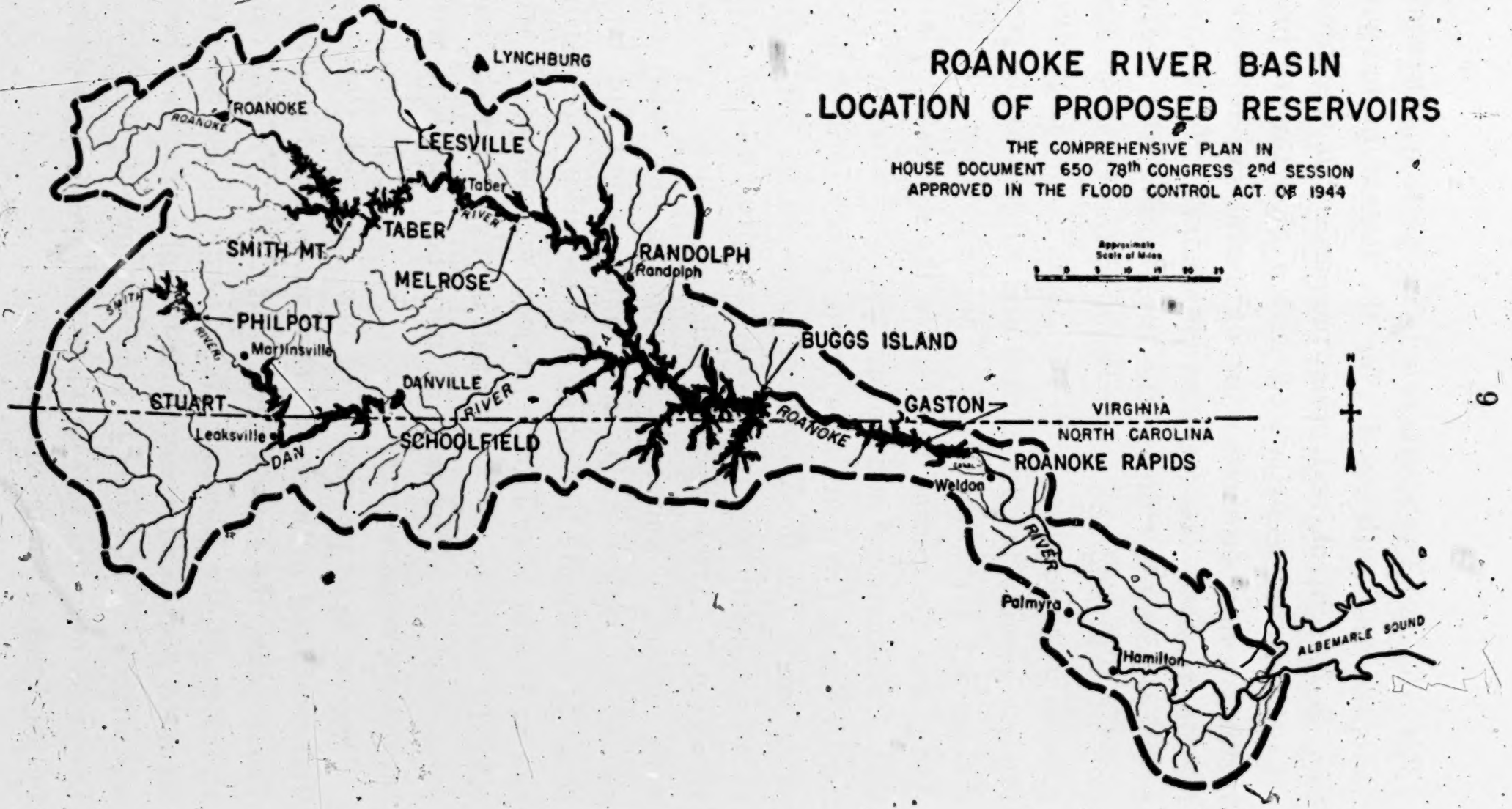
In section 6 of the Flood Control Act of 1936 and in section 6 of the Flood Control Act of 1938, the sections authorizing investigations and surveys for flood control and other purposes, Congress provided that

> "the Government shall not be deemed to have entered upon any project for the improvement of any waterway mentioned in this Act until the project for the proposed work shall have been adopted by law".

Then came the Flood Control Act of 1944 (58 Stat. 887). In the introductory paragraph of section 10 of this act, Congress "adopted and authorized" a large number of works of improvement described in subsequent paragraphs of this section, each paragraph dealing with a river basin plan. One of these paragraphs is entitled "Roanoke River Basin," and in it Congress "approved" the general plan for the comprehensive development of the Roanoke River basin for flood control and other purposes recommended by the Chief of Engineers in House Document 650, 78th Congress, 2d Session, and "authorized" the construction of the Buggs Island and Philpott units at an estimated cost of $36,140,000.

ROANOKE RIVER BASIN
LOCATION OF PROPOSED RESERVOIRS

THE COMPREHENSIVE PLAN IN
HOUSE DOCUMENT 650 78th CONGRESS 2nd SESSION
APPROVED IN THE FLOOD CONTROL ACT OF 1944



All the works enumerated in section 10 were "adopted and authorized" for the benefit of navigation, flood control, and other purposes "in the interest of National security and with a view toward providing an adequate reservoir of useful public works for the postwar construction program." They were to be prosecuted "under the direction of the Secretary of War and the supervision of the Chief of Engineers in accordance with the plans in the respective reports hereinafter designated and subject to the conditions set forth therein." The Department of the Army was authorized to prepare the necessary plans and specifications and to do the preliminary work "with funds from appropriations heretofore or hereafter made for flood control, so as to be ready for rapid inauguration of a postwar program of construction." After the then existing critical situation with respect to materials, equipment, and manpower should no longer exist, and in any event not later than immediately following the cessation of hostilities in World War II, the projects enumerated in section 10 were to be "initiated as expeditiously and prosecuted as vigorously as may be consistent with budgetary requirements."

Despite these provisions of law, in which Congress "adopted and authorized" the entire Roanoke River Basin plan, the Commission held that "Federal construction of the Roanoke Rapids unit of the congressionally approved comprehensive plan has not been authorized." It failed to hold that by this enactment Congress adopted this development to be undertaken by the United States itself.

2. By section 2 of the Flood Control Act of 1936, it was provided:

> That, hereafter, Federal investigations and improvements of rivers and other waterways for flood control and allied purposes shall be under the jurisdiction of and shall be prosecuted by the War Department under the direction of the Secretary of War and supervision of the Chief of Engineers, * * * except as otherwise provided by Act of Congress.

The same provision was enacted in section 1 of the Flood Control Act of 1938, in section 1 of the Flood Control Act of 1941, and in section 2 of the Flood Control Act of 1944. These provisions have been codified in 33 U. S. C., 1946 ed., sec. 701a–1.

When H. R. 4485, 78th Congress, 2d Session (the bill which became the Flood Control Act of 1944) was before the Senate Committee on Commerce, the Commission, through its Chairman, requested that the following proviso be incorporated in section 1 (enacted as sec. 2) of the bill:[3]

> "* * * that nothing therein shall be construed to limit the authority and functions of the Federal Power Commission as provided by acts of Congress."

This recommendation was not adopted.[4]

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[3] Hearings on H. R. 4485, 78th Congress, 2d Session, before the Senate Committee on Commerce, p. 12.

[4] In later enactments (for example section 6 of the River and Harbor Act of 1945 (59 Stat. 10, 25), section 7 of the River and Harbor Act of 1946 (60 Stat. 634, 638), and section 110 of the River and Harbor Act of 1950 (64 Stat. 163, 168), Congress did adopt this suggestion in the following language:

Despite these provisions, the Commission held that "there has been no legislation by Congress which * * * withdraws the Roanoke Rapids site from the licensing jurisdiction of the Commission."

3. The statutory provisions in Section 10 of the Flood Control Act of 1944 with regard to the comprehensive plan for the development of the Roanoke River basin have not been repealed or amended by Congress. Commission's staff counsel, however, took the position that the comprehensive plan has been so modified "by the pending application" and the Army Engineers as to open the Roanoke Rapids site for non-Federal development.

The Commission arrived at findings and conclusions which are meaningless, unless it is assumed that that comprehensive plan has been "modified by the pending application" and by the Army Engineers, as urged by Staff counsel. These findings are that VEPCO's proposed project is "best adapted to the

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"* * * *that this section* shall not be construed to interfere with the performance of any duties vested in the Federal Power Commission under existing law." (Emphasis supplied.)

In each instance, the section referred to was one in which the Secretary of War was authorized and directed to make preliminary investigations and surveys. The proviso was not adopted as a limitation on the jurisdiction of the Department of the Army over investigations and improvements, as provided in 33 U. S. C. 701a–1, nor was it made applicable to projects "adopted and authorized" or to plans of development "approved" by Congress upon recommendation of the Chief of Engineers. The effect of the proviso was to leave the jurisdiction of the Commission undisturbed pending investigations and surveys to be made by the Army Engineers under the authority of these particular sections. It should be noted that such proviso was not included in section 205 of the Flood Control Act of 1950 (64 Stat. 163).

Congressionally approved comprehensive plan," or is "in harmony with the approved comprehensive plan."

B. Applicability of section 7 (b) of the Federal Power Act

1. Before submitting his report on the Roanoke River Basin to Congress, the Chief of Engineers, in accordance with established practice, transmitted the reports of the District Engineer, the Division Engineer and the Board of Engineers for Rivers and Harbors, to the Federal Power Commission. On May 3, 1944 the Commision, through its Chairman, addressed a letter to the Chief of Engineers, stating that it concurred in the conclusion of the Board of Engineers for Rivers and Harbors that—

> the comprehensive development of the Roanoke River Basin, in general accordance with the plans prepared therefor by the District Engineer consisting of 11 dam and reservoir projects with power, is desirable and that the Buggs Island and Philpott projects would constitute a desirable initial step in the development of the Roanoke River Basin.

The Chief of Engineers made the Commission's letter a part of House Document 650. He commented on it in his report to Congress, stating that he arrived at his findings after due consideration of both the reports of the Army Engineers and the comments of the Federal Power Commission. He added:

> The authorization should be broad enough to permit the changes suggested by the Federal Power Commission, if found desirable when construction is initiated.

The Commission held that "the concurrence by the Federal Power Commission in the recommendations of the Chief of Engineers contained in House Document 650 did not constitute a finding or recommendation submitted to Congress under the provisions of Section 7 (b)."

2. The construction of the Roanoke Rapids project by VEPCO will adversely affect the Federal development of the Roanoke River basin in the following respects:

(a) The withdrawal of the Roanoke Rapids unit from the comprehensive plan will decrease the feasibility of the plan and will, on the basis of 1948 estimates, reduce its net power benefits [5] by an amount in excess of $1,500,000 per year or $75,000,000 over the usual 50-year period of the Federal Power Commission license.

(b) The withdrawal of the Roanoke Rapids unit from the comprehensive plan will substantially diminish the amount and will increase the cost of the power and energy available to the Secretary of the Interior for disposition pursuant to Section 5 of the Flood Control Act of 1944.

(c) VEPCO's project, with an elevation of 132 feet, will back water up against the Gaston unit in the comprehensive plan, thus reducing its capacity and requiring additional expenditures by the United States.

[5] By "net power benefits" we mean the excess of the value of fuel generated electric power under private development over the annual cost of the hydroelectric development.

The Commission made no findings concerning the effect of the withdrawal of the Roanoke Rapids unit on the comprehensive plan as a whole. It found that the withdrawal of the Roanoke Rapids unit from this plan would not affect the Secretary's functions in marketing the power from the Buggs Island project or from the other units in the comprehensive plan. With reference to the effect of the proposed project on the Gaston unit, the Commission made no express finding, but impliedly found that the proposed project would adversely affect the Gaston unit. In its order it required VEPCO to "make adequate investigations of the suitability and economic feasibility of the proposed relocated Gaston site and obtain the approval of the Commission before establishing finally the height of the Roanoke Rapids pool at elevation 132 mean sea level," as if it were within the power and authority of either VEPCO or the Commission to relocate the Gaston site in the comprehensive plan approved by Congress.

3. Section 7 (b) of the Federal Power Act provides that

> "Whenever, in the judgment of the Commission, the development of any water resources for public purposes should be undertaken by the United States itself, the Commission shall not approve any application for any project affecting such development, * * *.

Since the Commission held that its letter of May 3, 1944, did not constitute a finding and recommendation that the development of these water resources be undertaken by the United States itself, it impliedly

held that it was not prohibited by Section 7 (b) of the Federal Power Act from approving VEPCO's application.

C. Commission's discretion to reverse its previous position

The recommendations of both the Army Engineers and the Federal Power Commission were before Congress when it considered and approved the general plan for the comprehensive development of the Roanoke River basin. After the approval of the plan, Congress appropriated huge sums for the construction of the Buggs Island unit, and the construction is nearing completion at an estimated cost of $78,000,000.

The Commission failed to find these facts and failed to rule on the question, though squarely presented, whether it was within the limits of the Commission's discretion, by reversing its own position, to set aside the Congressional approval arrived at upon its previous recommendation. By its order authorizing the issuance of a license, however, the Commission by necessary implication held that it was within the proper exercise of its discretion to reverse and set aside its previous recommendation upon which Congress had acted, and consequently the action of Congress itself.

D. The right of the Commission to surrender potential power assets of the United States

Roanoke Rapids is the most valuable of the 11 projects units in the comprehensive plan. It derives its value for power development mainly from the upstream Buggs Island dam and reservoir which has a controlled storage of 2½ million acre-feet. Roanoke

Rapids is a run-of-the-river plant with practically no storage capacity, and may fairly be said to be one of the powerhouses for the Buggs Island reservoir. Because of the Buggs Island unit in the comprehensive plan, the net power benefits of the Roanoke Rapids unit, based on 1948 estimates, are $1,518,000 per year, or in excess of $75 million over the 50-year period of the license authorized by the Commission. These net power benefits are potential power assets of the United States to be derived from its investment of $78,000,000 in the Buggs Island unit. To grant a license for the construction of a project at Roanoke Rapids means to deprive the United States of these assets and turn them over to VEPCO without equivalent compensation.

The Commission failed to find these facts, or to pass on the question whether it had the right thus to dispose of potential assets of the United States. It found that "the plan for the development proposed by the Applicant will require no Federal participation or appropriation for its successful completion."

E. Adaptability of the proposed project to the purposes set forth in section 10 (a) of the Federal Power Act

In approving the general plan for the comprehensive development of the Roanoke River basin recommended by the Chief of Engineers, Congress adopted and made its own his finding that "the comprehensive plan as recommended by the Board [of Engineers for Rivers and Harbors] provides for optimum development of the water resources of the basin." This finding had reference to the 11 dams and reservoirs,

including the one located at Roanoke Rapids, as shown in House Document 650, 78th Congress, 2d Session.

The Commission found that VEPCO's proposed project was "in harmony with the approved comprehensive plan" and that it was " 'best adapted to the comprehensive plan' as that language was used in Section 10 (a) of the Federal Power Act." It held that VEPCO's proposed project was "best adapted to the Congressionally approved comprehensive plan for improving and developing the waterway involved for the use and benefit of interstate commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes." By implication it held that the finding adopted by Congress was not conclusive on the Commission, but that the latter could substitute its judgment for that of Congress as to which project would be "best adapted" for the purposes mentioned.

F. Single project v. comprehensive river basin plan

The enactment of the Federal Water Power Act of 1920 marked an advance over the previous approaches to the development of water resources. The requirements of Section 10 (a) of the Federal Power Act, as the first condition precedent for the granting of a license for the construction of a project, are best enunciated in the following statement appearing in the Commission's brief in *Idaho Power Company* v. *Federal Power Commission* (No. 10,530 U. S. Ct. of App. for the D. C. Cir., p. 9):

> In the issuance of a license for a particular project, the Commission is not limited to a consideration of the locality in which it is to be constructed, but must consider comprehensive plans for development of the entire river basin of which it is a part for the purposes of navigation, of waterpower development, and of other beneficial public uses (Sec. 10 (a)), comprehensive development being one of the basic objectives of the statute.

River basin development must be regarded as the basic unit of water resources development, if the maximum benefits are to be realized. The maximum benefits can be realized only through the coordination and integration of the various project units from the standpoint of water regulation, land utilization, and power development.

Here Congress embarked upon a comprehensive river basin plan for flood control and allied purposes. On the other hand, VEPCO proposes to construct a single project, at a particular site, for a single purpose, not a comprehensive plan for the development of the entire river basin.

The Commission failed to consider in what manner and to what extent the proposed project would be suitable not only for water-power development but would also aid navigation, flood control and other public uses, including recreational purposes, so as to be adapted to a comprehensive plan of development.

The Commission failed to find the basic facts from which one could arrive at a conclusion that the proposed project would be adapted to, or be part of, a comprehensive plan of development. It merely stated

its inference or conclusion, in the language of the statute, but without supporting findings of the basic facts.

G. The economic feasibility of the proposed project

This is the second time that VEPCO has applied for a license to construct a project at Roanoke Rapids. The previous application, for a project with an initial installed capacity of 25,000 kw.,[6] was filed by VEPCO's subsidiary in 1929, and was withdrawn in 1935.

After the Corps of Engineers had made their studies and investigations, after the Chief of Engineers submitted his report (House Document 650), after Congress approved the comprehensive plan of development recommended in that report, and after the Corps of Engineers had embarked upon the construction of the Buggs Island reservoir at a cost now estimated at $78,000,000, VEPCO filed its present application. The present application calls for the construction of a project which VEPCO claims will have an installed and dependable capacity of 91,000 kw. and an annual energy output of 345,000,000 kw.-hr.

For a proposed project to be "best adapted" to the development of the stream for power, the minimum requirement is that the annual costs appertaining to the project would be equal to or less than the annual costs appertaining to an "equivalent steam program." VEPCO's Exhibit 15 (see page 21) purported to show

[6] The ultimate installed capacity was to be 41,000 kw., but that was on the assumption that the Gaston project would also be in operation.

EXHIBIT NO. 15

Virginia Electric and Power Company—Evaluation of Roanoke Rapids Hydro-Electric Project—Project No. 2009—Amended—91,000 kilowatts with Tailrace Canal

	Roanoke Rapids hydro program	Equivalent steam program
Capability, kw.:		
New	91,000	91,000
Existing	5,000	5,000
Total	96,000	96,000
Average annual output:		
On-peak kw-hr.:		
New (millions)	309	315
Existing (millions)	24	18
Total (millions)	333	333
Off-peak kw-hr.:		
New (millions)	36	27
Existing (millions)	6	15
Total (millions)	42	42
Estimated investment:		
Power development	$25,085,000	$11,757,000
Substation step-up and step-down	1,113,000	1,324,000
Transmission lines	540,000	500,000
Total	26,738,000	13,581,000
Assuming financing:		
55 percent debt	14,706,000	7,470,000
45 percent equity	12,532,000	6,111,000
Permissible net return on investment—6 percent	1,604,000	815,000
Interest on debt—3 percent	441,000	224,000
Balance for surplus	1,163,000	591,000
Balance before Federal income tax	1,876,000	953,000
Federal income tax, 38 percent	713,000	362,000
Permissible net return plus Federal income tax	2,317,000	1,177,000
Depreciation—hydro—58-year sinking fund at 6 percent—.212 percent	53,000	
Depreciation—steam—35-year sinking fund at 6 percent—.897 percent		105,000
Depreciation—substation—30-year sinking fund at 6 percent—1.26 percent	14,000	17,000
Depreciation—transmission line—30/50 year sinking fund 6 percent	2,000	4,000
Property tax	304,000	99,000
Annual capital charges and taxes	2,690,000	1,402,000
Transmission line and substation operation and maintenance expenses	7,000	21,000
Fixed station operation and maintenance less fuel—$2.35/kw. for steam	107,000	214,000
Variable station operation and maintenance less fuel—$0.000148/kw. hr.		51,000
Total operation and maintenance less fuel-station, substation and lines	114,000	286,000
General and administrative expenses and payroll taxes, Va., 12.7 percent; N. C., 13.3 percent	15,000	36,000
General and administration expenses for hydro license	20,000	
Fuel expense ($5.50 per ton f. o. b. mines)		1,509,000
Total annual cost	2,829,000	3,233,000
Excess of annual cost of steam over hydro	404,000	

that the total annual cost of the hydro program would be approximately $404,000 less than that of an equivalent steam program. However, the difference of $404,000 did not take into account any headwater benefit payments under section 10 (f) of the Federal Power Act.

Section 10 (f) of the Federal Power Act provides that, whenever any licensee is directly benefited by an upstream development of another licensee or of the United States,

> the Commission shall require as a condition of the license that the licensee so benefited shall reimburse the owner of such reservoir or other improvements for such part of the annual charges for interest, maintenance and depreciation thereon as the Commission may deem equitable.

Since it was evident that headwater benefit payments would constitute one of the substantial items of cost in the maintenance and operation of the proposed project, the amount had to be ascertained, in order to determine whether the proposed project would be economically feasible. The evidence presented and the decision reached were as follows:

(a) According to VEPCO, the Buggs Island dam will not contribute anything to the dependable capacity of the proposed project, the theory being that this project will have a dependable capacity of 91,000 kw., whether under natural flow conditions or under the regulated flow furnished by Buggs Island. The fact that under natural flow conditions the 91,000 kw. would be dependable for only 1 hour per week in

the peak month of the year, while with Bubbs Island in operation this capacity would be dependable for 47 hours per week in the peak month of the year, according to VEPCO, meant no increase in dependable capacity at all.

However, according to VEPCO, Buggs Island would contribute 70,000,000 kw.-hr. per year of additional energy. It maintained that the difference in cost of the hydro program would be $261,000, and that this should constitute the maximum headwater benefit payments which VEPCO might be required to pay.

This figure has no basis in fact or in law.

(i) It has no basis in fact, because, if the 70,000,000 kw.-hr. are not available from Buggs Island storage, then this amount of energy would have to be obtained by VEPCO from a steam plant. A computation based upon VEPCO's own evidence reveals that the value of this additional energy would be approximately $662,000 per year.[7]

(ii) The figure of $261,000 has no basis in law, because it does not even purport to be any equitable part of the annual charges for maintenance, interest, and depreciation applicable to the Buggs Island reservoir, as required by section 10 (f) of the Federal Power Act.

(b) The Secretary maintained that, in the comparison of the proposed project with and without Buggs

[7] According to VEPCO's Exhibit 15, the cost of generating 342,000,000 kw.-hr. of steam energy is $3,233,000. The cost of 70,000,000 kw.-hr. will therefore be $3,233,000 $\times \frac{70}{342}$ or approximately $662,000.

Island, the dependable capacity must be measured by the same yardstick, that is, by the same pattern of operations. Using the same yardstick, he demonstrated that Buggs Island would contribute at least 75,000 kw. of dependable capacity. The value of this capacity and of the 70,000,000 kw.-hr. of energy which VEPCO admitted would be contributed by Buggs Island, would be $1,955,000.

However, although the benefits conferred by the Buggs Island project unit on VEPCO's proposed project would be approximately $1,955,000 per year, the Secretary's evidence was to the effect that the maximum equitable part of the annual charges for interest, maintenance, and depreciation of the Buggs Island project unit would be $690,000.

(e) The Commission adopted VEPCO's contention that Buggs Island would not contribute to the capacity, but only to the energy output of the proposed project in the amount of 70,000,000 kw.-hr. per year. It found that "a payment by the applicant to reimburse the United States for headwater benefits actually conferred * * * could not equitably exceed, on the average, $250,000 annually." It made no determination of the basic facts relating to the annual charges for interest, maintenance, and depreciation applicable to the Buggs Island project unit; nor did it consider the actual value of the 70,000,000 kw.-hr. of energy derived from the regulated flow, namely $662,000.

The Commission rejected the Secretary's demonstration that Buggs Island would contribute over 75,000 kw. of dependable capacity to the proposed

project, stating that such demonstration was based upon the erroneous assumption that

> the proposed project must always occupy the same position on the system load as was assigned to it by the applicant's engineers for the fullest utilization of regulated flows of approximately 7680 c. f. s. at Roanoke Rapids during the month of highest system peak demand (December) as illustrated by Exhibit 74.

No such assumption was made by the Secretary. He did assume that Exhibit 74 represented VEPCO's best estimate of how the project would actually be operated, as testified by VEPCO's own witness.

The Commission rejected the Secretary's evidence that the headwater benefit payments could not equitably be less than $690,000 per year, despite the fact that this was the only evidence in the record based on the standards prescribed by section 10 (f) of the Federal Power Act.

The Commission's disposition of the question as to the economic feasibility of the proposed project may thus be summarized as follows:

(i) It found that the net excess of the annual cost of steam over hydro would be $150,000 per year.[8] By implication the Commission held that VEPCO sustained its burden of showing that the proposed project would be economically feasible, despite the fact that the $150,000 is well within the admitted margin of error applicable to the estimate of the total annual costs of over $3,000,000.

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[8] On this basis the total annual cost of the hydro project would be $3,079,000 for 345,000,000 kw.-hr. or 8.9 mills per kw.-hr.

(ii) Had the Commission assigned the real value of some $662,000 to the 70,000,000 kw.-hr., it would have had to find the proposed project infeasible by over $250,000 per year.

(iii) Had the Commission determined the headwater benefit payments in accordance with the standards in section 10 (f), namely $690,000, it would have had to find the project infeasible by $286,000 per year.[9]

(iv) The above considerations are based upon the erroneous assumption that the steam plant in Exhibit 15 in fact constituted an "equivalent steam program." This is not so. VEPCO is proposing to construct a 91,000 kw. hydro plant to meet its peak load demand, for which such capacity is needed for not more than one hour per day. In fact, according to VEPCO's exhibits, such dependable capacity is needed for only one hour per week in the peak month of the year. A steam plant with a rated capacity of 72,000 kw., overloaded by 25% during the short periods of the peak load demand, will furnish the required peaking capacity and will produce more than the 345,000,000 kw.-hr. per year which is the annual output expected from the proposed hydro program. In such circumstances, the excess of the annual cost of steam over hydro, computed on the basis of VEPCO's own testimony, would be only some $61,000, without any headwater benefit payments.

The Commission failed to consider that the "equivalent steam program" is a 72,000 kw. steam plant.

[9] The total annual cost would then be $3,519,000, or 10. mills per kw.-hr.

Had the Commission recognized this fact, admitted by VEPCO's own witness, it would have had to find the project infeasible by some $200,000 per year, even if the headwater benefit payments were determined to be only $250,000. Of course, if the headwater benefit payments were determined at $690,000 per year, the Commission would have had to find the project infeasible by $625,000 per year.

H. The public interest

The economic feasibility of a proposed hydro project is but one of the facts, and is the minimum requirement, necessary for the determination of the question whether a proposed project is "best adapted" for water-power development. If the total annual costs of a hydroelectric project are greater than the total annual costs of an equivalent steam program then, of course, the proposed project cannot be said to be "best adapted" for the purpose mentioned, because the consumers would have to pay more for such hydro power than for steam power. If it is shown that the total annual costs of a hydro project are equal to or less than of an equivalent steam program, then the question still remains whether another hydro project would benefit the consumers to a greater extent, before it can be said that the proposed project is "best adapted" to power development.

Based on 1948 estimates, the net power benefits of the Roanoke Rapids unit in the comprehensive plan approved by Congress amount to $1,518,000 per year. As between this Federal development and VEPCO's proposed project, the consumers' gain from the

former would be $1,368,000 per year on the basis of the Commission's finding. Actually, the gain to the consumers would be over $1,800,000 per year, if the Commission correctly applied the requirements of section 10 (f) of the Federal Power Act.

The average cost of power generated at the Buggs Island and Roanoke Rapids units in the comprehensive plan would be 4.16 mills per kwh. Obviously, the consumers would benefit more, if the power were sold to them at a basic cost of 4.16 mills per kwh. than if the cost were 10.2 mills, or even 8.9 mills. This would represent a reduction of 59% from the 10.2 mills, or 53% from the 8.9 mills.

The Commission did not consider these facts in determining whether VEPCO's proposed project is "best adapted" to a comprehensive plan for the water-power development. Having found that the proposed project would be economically feasible, it arrived at the *non sequitur* that the project would be "best adapted" to a comprehensive development of the river for power. It failed to consider that the lower cost of power generated at the Federal project was important not only because the public would benefit from the use of this low-cost power, but also because such rates would provide competition to an existing monopoly and would tend to reduce the rates charged to consumers throughout the area.

VII. POINTS TO BE RELIED UPON

The errors assigned in the Petition for Rehearing, insofar as they relate to the question presented here-

in, are the points to be relied upon. They may be summarized as follows:

1. The Commission misinterpreted and misapplied section 10 of the Flood Control Act of 1944 by holding that Congress did not reserve the development of the water resources of the Roanoke River basin for the United States itself, and that the Roanoke Rapids unit in the comprehensive plan approved by Congress was not withdrawn from the licensing jurisdiction of the Commission.

2. The Commission erroneously held that it had not previously expressed its judgment that the development of the water resources of the Roanoke River basin should be undertaken by the United States; it erroneously failed to find that VEPCO's proposed project would materially and adversely affect this Federal development; and it erroneously failed to hold that section 7 (b) of the Federal Power Act prohibited the approval of VEPCO's application.

3. Contrary to the ruling of this Court in *Savannah River Electric Co.* v. *Federal Power Commission*, 164 F. (2d) 408, the Commission reversed its previous position, after Congress, relying on the Commission's recommendation, approved the Roanoke Rapids site as an integral part of the comprehensive plan for the development of the Roanoke River basin for flood control and other purposes.

4. In approving VEPCO's application, the Commission divested the United States of potential power assets in excess of $75,000,000 over the 50-year period of the license ordered to be issued, although those

potential assets, in the form of net power benefits, were intended by section 5 of the Flood Control Act of 1944 to be distributed among the people in the area, with preference to public bodies and cooperatives.

5. The Commission set aside a finding adopted by Congress that the comprehensive plan recommended by the Chief of Engineers provided for the "optimum development of the water resources of the basin", and substituted its judgment that VEPCO's proposed project was "best adapted" to the comprehensive development of the basin.

6. The Commission erroneously failed to give consideration to the fact that the maximum public benefits from the development of water resources can be derived only if the river basin, rather than individual projects therein, is made the basic unit of development.

7. The Commission erroneously failed to hold that VEPCO had not sustained its burden of showing that its proposed project has economic feasibility. It failed to hold that, if headwater benefit payments were imposed in conformity with section 10 (f) of the Federal Power Act, VEPCO's proposed project would be economically infeasible.

8. In determining that VEPCO's proposed project is "best adapted" for water-power development, the Commission failed to take into consideration the interests of the consumers. Consideration of the facts pertaining to this subject must lead to the conclusion that the issuance of the license would not be in the public interest.

VIII. IMPORTANCE OF THE CASE

This case is of great importance both as a test case relating to all Federal basin developments and from the standpoint of safeguarding the potential power assets of the United States in this particular river basin. The consequences of the Commission's decision may be summarized as follows:

1. It puts into jeopardy all river basin developments approved by Congress, by making the realization of such developments contingent upon the nonissuance of licenses by the Commission.

2. It violates the principle that the river basin must be the basic unit of water resources development, if the maximum benefits are to be realized, and puts beyond reach any coordination or integration of river basins on a regional basis.

3. It operates against the principle established by Congress that public power should be so disposed of as to encourage the most widespread use thereof at the lowest possible rates to consumers.

4. The fruits of the Government's investment in upstream development will be utilized for the benefit of private power companies, rather than be distributed among the people in the area.

5. In granting a license to develop water resources, which means the grant of a public privilege, the Commission failed to consider the interests of the consumers, and failed to recognize that a license should not be granted for a proposed project, if the consumers can benefit substantially more by the construction of another or different hydroelectric project.

Wherefore, the petitioner prays that the order of the Commission issued January 26, 1951, be reviewed by this Court, that this Court enter its judgment wholly setting aside and annulling said order of the Commission, and that the Court grant such other and further relief as it may deem just and proper.

Respectfully submitted,

GREGORY HANKIN,
Counsel for Petitioner, the United States of America, on the relation of Oscar L. Chapman, Secretary of the Interior.

Petition for Review of Virginia REA Association et al.

To the Honorable Judges of the United States Court of Appeals for the Fourth Circuit:

Virginia REA Association, a corporation, and its interested members, Mecklenburg Electric Cooperative, Southside Electric Cooperative, Community Electric Cooperative, Prince George Electric Cooperative, Central Virginia Electric Cooperative, Virginia Electric Cooperative, Northern Neck Electric Cooperative, Northern Piedmont Electric Cooperative, Shenandoah Valley Electric Cooperative, B-A-R-C Electric Cooperative and Craig-Botetourt Electric Cooperative, all corporations, being aggrieved by the order of the Federal Power Commission issued on January 26, 1951, granting a license to Virginia Electric and Power Company, sometimes hereinafter called "VEPCO," and the order of said Commission issued on March 1, 1951, denying their petition for a rehearing, hereby petition this Honorable Court to review the said orders of the said Commission, and in support of this petition respectfully show:

I. The Nature of the Proceeding as to Which Review is Sought

1. On October 6, 1948, VEPCO filed an application with Federal Power Commission for a license to construct a hydroelectric project at Roanoke Rapids on the Roanoke River in North Carolina. On April 6,

1949, the application was amended. As amended, the application was for a project with an installed capacity of 125,000 h. p. or 91,000 kw.

2. On March 22, 1949, the Commission issued an order setting the matter for hearing before an Examiner.

3. On May 6, 1949, the Commission issued an order permitting petitioners to intervene in the proceeding.

4. Hearings were held before the Examiner in May and June, 1949. On March 17, 1950, the Examiner issued an intermediate decision deciding all issues of fact, law and discretion in favor of VEPCO. On application, the hearing was reopened and further hearings were held in June and July, 1950. On November 26, 1950, the Examiner rendered a supplemental decision, in which he reaffirmed his previous findings and conclusions.

5. Pursuant to the Commission's rules, the Secretary of the Interior and petitioners filed exceptions to the Examiner's decision. Oral agreement on the exceptions was had before the Commission on January 11, 1951. On January 26, 1951, the Commission issued its opinion and order No. 204 sustaining the Examiner's decision on all issues and ordering the issuance of a license to VEPCO for the construction of a hydroelectric project at Roanoke Rapids.

6. On February 19, 1951, the Secretary of the Interior filed his petition for a rehearing and on February 23, 1951, petitioners filed their petition for a rehearing. Both petitions were denied by orders of the commission dated February 27, 1951, issued on March 1, 1951.

II. THE FACTS AND STATUTES UPON WHICH JURISDICTION AND VENUE ARE BASED

Respondent, Virginia Electric and Power Company, is a Virginia corporation, qualified to do business and doing business as a public utility in the States of Virginia, West Virginia, and North Carolina, with its principal place of business in Richmond, Virginia, and the Roanoke Rapids project, for which VEPCO seeks a license, is located within the State of North Carolina, all within the jurisdiction of this Court. The jurisdiction of the Court is invoked under section 313 (b) of the Federal Power Act (16 U. S. C. A. 825.1). As heretofore stated, the order of the Commission granting the license was issued on January 26, 1951, and the respective petitions for rehearing filed by the Secretary of the Interior and petitioners were denied by the Commission in its orders issued on March 1, 1951.

III. THE RELIEF PRAYED

Petitioners pray that the order of the Commission issued January 26, 1951, and its order issued March 1, 1951, denying the rehearing, be reviewed by this Court, and that this Court enter its judgment wholly setting aside and annulling the said two orders and taxing the costs of this proceeding against VEPCO.

IV. THE POINTS ON WHICH PETITIONERS INTEND TO RELY

1. The points on which petitioners intend to rely, supplemented as hereinafter set forth, are the same as those stated in the petition for review of the United States of America on the relation of Oscar L. Chap-

man, Secretary of the Interior, filed simultaneously with this petition, and petitioners hereby adopt as their own and incorporate herein by reference the said petition. This is done to avoid repetition and to prevent an unnecessary extension of the record.

2. Petitioner, Virginia REA Association, is a nonstock membership corporation, not organized for profit, created and existing under the laws of the State of Virginia, and the other eleven petitioners are duly incorporated nonprofit membership electric corporations, organized and existing under the Electric Cooperatives Act of the State of Virginia.

3. Petitioners have an interest in the matter of the licensing of the Roanoke Rapids project, which is as follows:

(a) As set forth in its certificate of incorporation, petitioner, Virginia REA Association, was formed for the following purposes, among others:

> For the mutual aid and assistance of electric cooperatives organized under the provisions of the Electric Cooperatives Act of Virginia and similar or kindred laws of other States, and doing business in whole or in part, in Virginia; to foster and promote the program of rural electrification; to encourage the fullest possible use of electric energy at the lowest cost consistent with sound economy and prudent management; to develop the natural resources of the areas served by its members.

(b) Its membership included the other eleven petitioners which unite with it herein, all of which, as stated, are electric cooperatives with corporate existence. Under its charter and bylaws it stands obli-

gated to render aid and assistance to its members, to foster and promote the program of rural electrification and to encourage the fullest possible use of electric energy in rural areas at the lowest cost consistent with sound economy and prudent management. It is interested in obtaining for its members an adequate supply of low-cost power on reasonable terms and conditions and to that end to aid them in availing themselves of their statutory preferential right to power generated at public projects by the United States and marketed by the Secretary of the Interior. It is to its interest and the interest of its members that public power projects accessible to its members be developed and operated. The Roanoke Rapids project is such a project.

(c) The other eleven petitioners are nonprofit public service corporations, engaged in the business of distributing and selling electric power to some forty thousand consumers as of May 1949, in rural areas at, around and at a distance from the location of their respective principal offices, many of which consumers reside within the Roanoke River basin. These nonprofit cooperative public service corporations are subject to the jurisdiction of the State Corporation Commission of Virginia in like manner as other public service corporations. They are financed through loans of public funds from the United States made through the Administrator of the Rural Electrification Administration and appropriated for the purpose by the Congress of the United States in recognition and realization of the failure of the power companies to electrify the rural areas of America.

(d) There is now under construction the Buggs Island project on the Roanoke River upstream from the Roanoke Rapids, and under the provisions of section 5 of the Flood Control Act of 1944 (58 Stat. 887, Public Law 534 of the 78th Congress, 2d Session), the power from such project is to be transmitted and disposed of by the Secretary of the Interior in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers, consistent with sound business principles, the rate schedule to become effective upon the confirmation and approval by the Federal Power Commission. In said act it expressly is provided: "Preference in the sale of such power and energy shall be given to public bodies and cooperatives." Under this law the eleven petitioning cooperatives have, along with other cooperatives, a prior and preferred right to the power generated at said project and all other public power projects in the Roanoke River basin, superior to the applicant and all others, save public bodies and of equal dignity with such public bodies.

(e) While the Buggs Island project will generate a considerable amount of firm power, it is a multipurpose reservoir of great height and is designed principally for the accumulation, storage, and control of the waters of such river necessitating the flooding of large areas upstream, with the result that the cost of the said project in relation to the power generated will be much greater than a downstream power project such as Roanoke Rapids enjoying the regulated stream flow made possible by this large storage reservoir. On the other hand, the Roanoke Rapids project is

primarily a power development, requiring only a low dam and comparatively little flooding of upstream areas and enjoying the benefit of a regulated stream flow made possible by the Buggs Island project constructed by and at the expense of the United States. The result is that power can be generated much more cheaply at Roanoke Rapids than at Buggs Island. Consequently, it is to the interest of petitioners and their consumers that the United States construct both the Buggs Island and the Roanoke Rapids projects, and grant to said cooperatives and preference rights to which they are entitled under the law, marketing said power at rates based on the total cost incurred by the United States, by reason whereof the rates which the eleven petitioning cooperatives will be required to pay for the power generated as aforesaid will be greatly reduced. Said cooperatives and their service areas are so located that they can economically use said power from both projects, and some of them are located directly within the Roanoke River basin.

(f) All eleven petitioning cooperatives are both consumers and distributors of power, and were organized and function for the purpose of making electric service available in rural areas at the lowest rates consistent with sound economy and prudent management, thereby raising the standard of living of rural inhabitants; and to that end it is essential that they acquire power at the lowest possible cost. In addition, all of them are competitors of the respondent, Virginia Electric and Power Company, and are engaged in selling electric energy to the consumers in rural areas in portions of the same general terri-

tory in which it operates. All of them have an interest which will be directly, substantially, and adversely affected by the granting of the license applied for.

Wherefore petitioners pray that Federal Power Commission and Virginia Electric and Power Company may be made respondents to this their petition, and that relief may be granted as set forth in Section III hereof.

Respectfully,

VIRGINIA REA ASSOCIATION,
MECKLENBURG ELECTRIC COOPERATIVE,
SOUTHSIDE ELECTRIC COOPERATIVE,
COMMUNITY ELECTRIC COOPERATIVE,
PRINCE GEORGE ELECTRIC COOPERATIVE,
CENTRAL VIRGINIA ELECTRIC COOPERATIVE,
VIRGINIA ELECTRIC COOPERATIVE,
NORTHERN NECK ELECTRIC COOPERATIVE,
SHENANDOAH VALLEY ELECTRIC COOPERATIVE,
B-A-R-C ELECTRIC COOPERATIVE, AND CRAIG-BOTETOURT ELECTRIC COOPERATIVE, AND NORTHERN PIEDMONT ELECTRIC COOPERATIVE.

By ROBERT WHITEHEAD,
Lovingston, Virginia,
Their Attorney.

WHITEHEAD & MARSHALL,
Lovingston, Virginia.
Of Counsel.

[6009] OPINION No. 204

OPINION AND ORDER ISSUING LICENSE (MAJOR)

On October 6, 1948, Virginia Electric and Power Company, Richmond, Virginia, filed an application under the Federal Power Act for construction, operation and maintenance of a proposed major hydroelectric development described as Project No. 2009, to be located on the Roanoke River in Halifax and Northampton Counties, North Carolina, near Roanoke Rapids, North Carolina. The project proposed by the Applicant would cost approximately $27,000,000. It would consist principally of a mass concrete dam approximately 2,840 feet in length, of which about 250 feet would be occupied by a powerhouse and about 1,080 feet by a gate-controlled spillway, about 750 feet by an emergency overflow spillway, and the remainder by bulkhead sections at each end of the dam. The spillway crest would have an average height of about 40 feet above the bedrock of the river, with steel gates designed to hold the normal pond level at elevation 132 and to have a discharge capacity of about 350,000 c. f. s. with the pond at that level. The reservoir formed by the dam would have a surface area of about 4,900 acres at normal pond level. [6010] The turbines will have a total installed capacity of about 125,000 horsepower and there will be three generators rated at approximately 27,000 kilowatts each and one rated at about 10,000 kilowatts, making a total installed capacity of about 91,000 kilowatts.

On March 17, 1950, the Chief Presiding Examiner filed his decision in this proceeding. In this decision the Examiner included an order for issuance of the license as requested. Upon motion of the Secretary of the Interior the matter was reopened for the taking of additional evidence and on November 15, 1950, the Examiner filed a supplement to his decision in which he again concluded that a license should be issued. Exceptions to the decision of the Examiner were filed and on January 11, 1951, oral argument was heard by the Commission on the exceptions.

Every possible opportunity has been afforded for the presentation of evidence and argument in this proceeding and the many motions and pleadings attest to the thoroughness with which the problems involved have been considered. But the area served by the Applicant is in need of additional generating capacity and our final decision should not be delayed.

[6011] The Roanoke River drains parts of Virginia and North Carolina and empties into Albermarle Sound. In its lower 130-mile section up to Weldon, North Carolina, it is used for navigation and over the years it has been a source of occasional floods which, by reason of their severity, have made preventive measures imperative. A comprehensive plan for improvement of the river basin was presented by the Chief of Engineers in 1934, in accordance with the provisions of H. Doc. 308, 69th Cong., 1st Sess. The latter document listed the streams recommended by the Chief of Engineers and the Federal Power Commission for Federal investigation and outlined the objectives to be sought through improvement and

development and is followed in subsequent comprehensive reports. A modification of the 1934 Army "308 Report" was submitted by the Chief of Engineers in 1944, pursuant to Congressional direction, and published as H. Doc. 650, 78th Cong., 2d Sess.

By a paragraph in Section 10 of the Flood Control Act of 1944, Congress approved the general plan of development recommended in H. Doc. 650 and specifically authorized construction of the Buggs Island and Philpott projects, which were among the eleven included in the general plans. It is expected that the Buggs Island project, located a short distance upstream from Roanoke Rapids, will be completed within two or three years, at least to the initial [6012] power installation of 108,000 kilowatts out of the 204,000 kilowatts recommended by the latest revised plans of the Army Engineers. In addition to increasing the power installation at the Buggs Island site, the Chief of Engineers had made other substantial changes in that development from the proposal which he recommended in H. Doc. 650.

It has been suggested that the Commission should not approve the application on the ground that the Roanoke Rapids site was reserved for development exclusively by the United States through the approval by Congress in Section 10 of the Flood Control Act of 1944 of the recommended general plan of development carried in H. Doc. 650. This suggestion assumes that Congress in the 1944 Act adopted a new policy with respect to the development of water power resources under licenses to be issued pursuant to the Federal Power Act by reserving all of those sites

included in recommended general plans of development approved by Congress.

We are not persuaded, however, that Congress either by this Act or by any other statute has removed all undeveloped water power sites, or the Roanoke Rapids site, from our licensing jurisdiction, or that the licensing provisions of the Federal Power Act have been restricted in the manner suggested.

We have, however, given consideration to the question of whether the pending application should be denied, pursuant to the [6013] provisions of Section 7 (b) of the Act, and whether we should recommend to Congress that the development of these water resources be undertaken by the United States.

The only public benefit to be obtained through development of the Roanoke Rapids site will be through the generation and distribution of electric power, whether that site is developed by the United States or by some other interest. Our consideration is limited to those matters stated in the Federal Power Act under which we are considering the application and by the statutes of Congress expressing its intentions. As shown by the Examiner, Congress has been aware of the pendency of the application for the Roanoke Rapids site and of the possibility that a license might be issued for construction of a power plant by the Applicant which would preclude Federal development of that site. There has been no move, however, to obtain Congressional authorization for Federal development of the Roanoke Rapids site by the United States.

The Federal Power Act looks to prompt development of water resources where such development is feasible and in the public interest, and it gives to the Commission discretionary power to delay utilization only where such delay is found to be imperative. In addition to the desirability of using power whenever such use is more economical than the use of nonreplaceable fuels, as we said in another connection, we must consider the effect upon the **[6014]** general public in the area affected. The Power Act accords to the consumers served by the applicant the right to obtain the benefits of water power development and they should be given those benefits as quickly as possible.

Development of the Roanoke Rapids site by the United States, in addition to requiring Congressional authorization, is dependent upon many uncertain factors such as adequate steam-electric generating support and availability of the type of market for which both the Buggs Island and the Roanoke Rapids peak power is most valuable.

No sound reasons have been advanced to convince us that the interest of the public at large will not be fully protected and promoted by the issuance of the license requested and we cannot assume that Congress intends for us to disregard the responsibilities which it has placed upon us. Congress has already provided for substantial flood control in the Roanoke River Basin and development of the Roanoke Rapids site for power will neither enhance nor detract from the benefits sought by Congress in this respect.

The principal objections to the issuance of a license for the Roanoke Rapids project have been raised by the Secretary of the Interior, and his intervention was ordered by the Examiner. We call attention to the fact, however, that the only function assigned by [6015] Congress to the Secretary of the Interior in connection with the development of Roanoke River is to dispose of surplus power generated at the Buggs Island and Philpott flood control projects. This function, carried in Section 5 of the Flood Control Act of 1944, has not been extended by Congress to the submittal of recommendations by the Secretary of the Interior to it for the construction of projects serving only the purpose of providing electric power.

The Virginia REA Cooperative, representing a number of member cooperatives located in Virginia, opposed the application principally on the ground that the rates for power which the member cooperatives purchase will be increased if the Roanoke Rapids plant is constructed by the Applicant rather than by the United States. While we have permitted their intervention in this proceeding, these cooperatives have not shown that under the law as we must administer it they would be aggrieved by approval of the pending application.

The findings of the Examiner appear to be in accordance with the Federal Power Act and the other statutes which we have mentioned and to be fully supported by the weight of evidence and his order should be adopted.

Upon the record before us and for the reasons set forth herein, the Commission further *finds:*

[6016] (1) There is an authorized navigation project for the Roanoke River, which was adopted by the Congress in 1871. This project was modified in 1930 and 1938 in certain respects in accordance with recommendations of the Army Chief of Engineers, but the portion of the authorized navigation project lying between Palmyra Landing and Weldon, North Carolina, has not been modified by Congress since its adoption in 1871. The 1871 authorized navigation project calls for a channel 5 feet deep, 50 feet wide, and 50 miles long between Palmyra Landing and Weldon, North Carolina.

(2) No improvement work, other than routine maintenance of the existing channel, has been performed on the upper portion of the navigation project between Palmyra Landing and Weldon, North Carolina, since 1905. (H. Doc. No. 694, 7th Congress, 3d Session, p. 10.) In 1943, the Chief of Engineers reported that the existing project had been completed to the practicable limit and that it was impracticable to develop and maintain the project above Palmyra by [6017] dredging, snagging and regulation. (Annual Report, Chief of Engineers, 1943, Part 1, Vol. 1, p. 426). This statement is repeated in the latest (1949) Annual Report of the Chief of Engineers. (Part 1, Vol. 1, p. 620.)

(3) Low water depth at Weldon, North Carolina, was reported to be about one foot in 1937. In the latest separate report on this river by the Chief of Engineers, requested by Congress, the low water depth from Palmyra to Scotland Neck was stated as being two feet, and thence to Weldon, about one foot.

In the said latest (1949) Report of the Chief of Engineers (Part 2, p. 549) the controlling depth in the Palmyra-Weldon section is stated to be one foot.

(4) The Roanoke River is a navigable water of the United States, as defined in Section 3 (8) of the Federal Power Act, at and above the sites of the project proposed in the application and the applicant's existing Roanoke Rapids development.

(5) Upon the filing of the application for license by the Applicant for Project No. 2009, the Commission, under Section 4 (e) of the Federal Power Act, requested the Department of the Army to study the Applicant's plans [6018] affecting navigation and to recommend for insertion in the license such terms and conditions as that Department might deem necessary in the interest of navigation.

(6) The Department of the Army advised the Commission that the present plans of the proposed structures appear to be satisfactory in respect of the interests of navigation and recommended certain usual terms and conditions for inclusion in any license issued for the project. Among these virtually standard conditions were reservations of the right of the United States to construct, complete or improve navigation facilities in connection with the said project; provision for free power for operation of the aforesaid facilities; reservation of the right of control of the operation of navigation facilities including control of the level of the pool caused by the dam; reservation of the right to use water for the purposes of navigation and reservation of the right to control the use,

storage, and discharge of water in the interest of navigation.

(7) The Department of the Army did not recommend or suggest any provision for continuous minimum releases in the interest of navigation, nor were regulations **[6019]** specifying rates of increase in discharge from the power plant recommended or requested to be included in a license. It was indicated that rates of change of discharge might be imposed at some later date if it should be found necessary in the interest of navigation.

(8) The Army's Definite Project Report (Exhibit 10) for the Buggs Island project, now under construction, and a letter dated May 4, 1949, from the Chief of Engineers (Exhibit 9), state that the Buggs Island Reservoir will be operated primarily for the control of floods and for the development of hydroelectric power, but that incidental operation of the project for pollution abatement and low-water regulation is also planned. These exhibits contain an evaluation of flood control, land enhancement, power, and incidental benefits, but no evaluation of navigation benefits.

(9) The Army Engineers' reports, Exhibits 8 and 10, specify no minimum release of water for navigation from either the Buggs Island or Roanoke Rapids project but do provide for minimum continuous releases in the interest of pollution abatement and the conservation of fish life, varying from 500 c. f. s. in the fall and winter to 2,000 c. f. s. in the spring and summer.

[6020] (10) Maintenance of a five-foot open navigation channel from Palmyra Landing to Weldon might require approximately 2,500 c. f. s. continuous flow in addition to snagging and dredging operations. Such release is not provided for in the Army's present operation plan for the Buggs Island Reservoir, nor has the Department of the Army recommended or made any provision in its report under Section 4 (e) of the Act that such continuous flow, or any other continuous flow for the same purpose, be provided by the Applicant's proposed project at Roanoke Rapids.

(11) Without upstream regulation during periods of low flow, it would be physically impossible for any project down at Roanoke Rapids to release a continuous flow of 2,500 c. f. s. with the small storage contemplated or practicable at that site, there being extensive periods which recur annually when the natural flow of the river is considerably less than 2,500 c. f. s. The same limitations would exist if the Roanoke Rapids project were to be authorized and built by the Government according to the comprehensive plan contained in House Document 650.[1]

[6021] (12) The Buggs Island project could provide a minimum continuous flow of 2,500 c. f. s. by the release of water from storage during low-flow periods, if required in the interest of navigation. Whether or not such continuous releases would reduce the capacity of the Buggs Island project would depend upon the type of load this project may be required to serve, but in any event would seriously

[1] Exhibit No. 1.

reduce the economic value of that plant and might render it completely infeasible for peak-load purposes.

(13) Since the Roanoke Rapids project either as proposed by the Applicant or as proposed by the Army Engineers would be largely a run-of-river development with pondage suitable only for peaking purposes, any continuous release required of it for navigation would necessarily first emanate from an upstream storage reservoir sufficient in size to provide water for such continuous release. This would be the case whether a project at Roanoke Rapids were built by the Applicant or by the United States, since the site at Roanoke Rapids does not lend itself to development of a large reservoir.

(14) With Buggs Island project in operation as contemplated in the Definite Project report, the Roanoke Rapids [6022] project could act as a reregulator releasing at least a minimum continuous flow of 2,500 c. f. s. as may be required for any possible future navigation without adversely affecting its economic feasibility, while enabling the Buggs Island project to act without restriction as a peak load plant.

(15) There is no evidence here which establishes the probability of a future requirement for any continuous minimum release of water for navigation from storage reservoirs on the Roanoke River.

(16) The evidence does not show that the 1871 adopted navigation project between Weldon and Palmyra Landing will be reactivated within the foreseeable future. In fact, the evidence is to the contrary. Accordingly, the Applicant's economic

analysis of the proposed Roanoke Rapids project, which is based on a 58-year depreciation period, need not take into account a 2,500 c. f. s. continuous release for navigation.

(17) House Document No. 650 proposes that if and when navigation improvements immediately below Weldon are contemplated, the proper modern-day development would be for 8-foot navigation and that this could be provided by the installation of a lock and slack-water [6023] navigation dam at mile 114, about 24 miles below Weldon. This proposal would appear to have a logical basis in view of the fact that the present navigation channel to Palmyra, the present head of navigation, has been improved to provide for 8-foot navigation.

(18) If the Palmyra Landing-Weldon section of the Roanoke River should be improved for navigation in the manner suggested in House Document 650, it would be unnecessary for any continuous minimum flow requirements to be imposed by the Department of the Army, either on its own Buggs Island project or any project at Roanoke Rapids, since the pool of the Army-suggested dam at mile 114 could act as a re-regulator providing the continuous flow required for the reach of the river between mile 114 and Palmyra. The pool itself would provide navigable depths from mile 114 to Weldon.

(19) The proposed Roanoke Rapids project will be fully dependable to 91,000 kw. capacity on the Applicant's system load under regulated flow conditions during the critical period, as contemplated in the

Definite Project Report, even if required to release a continuous flow of 2,500 c. f. s. for navigation.

[6024] (20) The Buggs Island project will probably provide 4,310 c. f. s. as the minimum uniform regulated flow at Roanoke Rapids for the critical flow period.[2] But, the regulated outflow of the Buggs Island project when operated as proposed in the Definite Project Report would be 7,000 c. f. s. during December of the critical period and December is the month of peak demand on the Applicant's system. The evidence shows that the Roanoke Rapids project would be fully dependable on the Applicant's load with either 4,310 or 7,000 c. f. s. and could release a continuous flow for navigation of 2,500 c. f. s. if required.

(21) There is no evidence of substance expressly showing the extent of recreational use of the stream below the Roanoke Rapids site or the effect of the operation of the proposed Roanoke Rapids project on recreation. However, it is common knowledge that a reservoir with limited drawdown such as that contemplated by the Applicant will within itself provide substantial recreation benefits for the area.

[6025] (22) The Roanoke Rapids project, either as contemplated by the Applicant or exactly as proposed in House Document No. 650, would have no effect (either beneficial or adverse) upon the flood-control plans for the basin. The contemplated storage at Roanoke Rapids is of insufficient magnitude to

[2] Exhibit No. 87 and testimony of Administrator Creim (T. 2483).

impound the water necessary for flood control purposes. Regulation of water for flood control is provided by the Government's Buggs Island project which was designed for that primary purpose, and the spillway gates at Roanoke Rapids, as contemplated by the Applicant, must be operated in such a manner as not to nullify or impair flood control benefits to be obtained from the Buggs Island project. There is no evidence that the operation of the Roanoke Rapids project, as proposed by the Applicant, would constitute an unusual hazard to life or property.

(23) The same releases of water for pollution abatement and preservation of fish life are provided for in the operation of the proposed Roanoke Rapids project as for the Government's Buggs Island project. The requirements for off-peak continuous releases by the Buggs Island project, for pollution abatement and [6026] control and maintenance of fish life, all relate to the section of the Roanoke River at or below Roanoke Rapids. For this reason the Applicant's proposed project could relieve the Buggs Island project of the burden of providing these continuous releases during off-peak periods, and is "best adapted" for these beneficial public uses.

(24) In order to be "best adapted to a comprehensive plan" for the "improvement and utilization of water power development," as that language is used in Section 10 of the Act, a proposed hydroelectric plant of course must be economically feasible. To be economically feasible, such project must be capable of fulfilling the anticipated load requirements at an annual cost equal to, or less than, that which would

be paid for the equivalent power obtainable from an alternative source.

(25) The load requirements of the Applicant, as projected through 1952, show that in order to continue to perform its duty competently the Applicant must have at least 91,000 kw. of additional capacity from some source. The evidence introduced which establishes this need has not been challenged or controverted.

[6027] (26) The load of the Applicant now supplied largely by steam-electric plants will have such magnitude and shape by 1953 that the capacity of the project which the Applicant proposes to construct at the Roanoke Rapids site will be fully dependable upon such load, and the energy output will be fully absorbed.

(27) The dependable capacity of the proposed Roanoke Rapids project will be 91,000 kw. on the Applicant's anticipated system load under natural flow conditions comparable to the lowest December weekly flows of record and considering the required minimum continuous releases for pollution abatement and conservation of fish life.

(28) The dependable capacity of the proposed Roanoke Rapids project will be 91,000 kw. on the Applicant's anticipated system load under low-water regulated flows from the Government's Buggs Island project. It has been established that under such regulated flow conditions a continuous release of approximately 2,500 c. f. s. may be made without affecting the dependable capacity of the proposed project, if such release should ever be required for navigation.

[6028] (29) The average annual energy output from the proposed Roanoke Rapids project, if required to operate on natural stream flow, is estimated to be 275,000,000 kw.-h.

(30) Additional generating capacity is needed now and will be required in the future in the area to be served by the Roanoke Rapids project. The Applicant's system can utilize the full capacity and output of the plant on the basis which it proposes.

(31) Storage regulation by the Government's Buggs Island project may permit the Roanoke Rapids project to generate as much as 70,000,000 kw.-h. more energy than it would generate on natural stream flow.

(32) If the Applicant were to construct a steam plant in order to secure an additional 91,000 kw. of dependable capacity, and 275,000,000 kw.-h. of average annual energy for its system (which would be obtainable from the Roanoke Rapids plant utilizing the natural flow of the river), the annual cost of such a plant would be at least $150,000 more than the annual cost of the Roanoke Rapids project.

(33) The 70,000,000 kw.-h. of additional average annual energy which may result from storage regulation by Buggs Island would cost the Applicant about $250,000 if obtained from a steam plant.

[6029] (34) A payment by the Applicant to reimburse the United States for headwater benefits actually conferred, therefore, could not equitably exceed, on the average, $250,000 annually, but such payment on this basis is not now required under the Federal Power Act.

(35) The amount of the payments for headwater benefits due under the Federal Power Act cannot be estimated with any degree of accuracy until after the project has been placed in operation for such time as necessary to demonstrate what actual benefits are being conferred. There has been no evidence adduced which can be accepted as establishing at this stage when the project does not exist, that payments for the headwater benefits to be conferred would be of such magnitude as to render the project economically infeasible for private development.

(36) Low-water regulation by the Buggs Island project will confer no capacity benefits upon the Roanoke Rapids project since the Roanoke Rapids would be fully dependable (91,000 kw.) by utilizing project would be fully dependable (91,000 kw.) by utilizing only natural river flow.

(37) Headwater improvements may enhance the economic feasibility of a downstream project. In the process of [6030] conferring "benefits", an upstream improvement cannot impair the feasibility of a downstream project which would be economically feasible without such benefits. Thus, if it be established that a downstream project would be a successful enterprise if required to operate on natural flows or their equivalent, such project is destined to remain a successful enterprise if the flows of the river are improved by upstream storage regulation. The evidence shows that the proposed Roanoke Rapids project would be economically feasible on the natural flow.

(38) The Southeastern Power Administrator, marketing agent of the Department of the Interior

under the Flood Control Act of 1944 for Government-produced energy in the Southeastern United States, stated as a witness in this proceeding that the operation of Buggs Island will not be such as to deprive the Applicant of water which would be equivalent to the natural flow of the stream. With such express assurance voluntarily given by the Administrator in the record, it will not be necessary for the Applicant to enter into a contract with the Government to protect itself against upstream operation which might render its project less favorable by **[6031]** impairing its dependable capacity. The assurance of the Southeastern Power Administrator that he will not operate Buggs Island so as to deprive the Applicant's project of the equivalent of the natural flow of the stream, which, if done, might well make it less feasible, furnishes a correct assurance of the cooperation referred to in the Examiner's decision of March 1950 as desirable and proper between the Government and private investors.

(39) The evidence shows that 10,120 day second-feet of water[3] (or c. f. s. days) would be needed at Roanoke Rapids to supply the requirements of the project for peaking purposes (91,000 kw.) and continuous minimum releases (500 c. f. s.) during the peak load week of December. It has been shown also that the project could be operated so as to supply the necessary 91,000 kw. of capacity during the periods when such capacity would be required by the system, with flows equal to those recorded for the

[3] A day second-foot is the volume resulting from a uniform flow of 1 c. f. s. flowing for a period of one day (86,400 cubic feet).

month of December 1917 (the lowest December flow of record, a condition largely attributed to unusual ice conditions) or for December 1931 (the December of the lowest water year on record).

[6032] (40) The exhibits introduced by Interior[4] relating to dependable capacity and headwater benefits are all based upon a common erroneous assumption. This assumption is that the proposed project must always occupy the same position on the system load as was assigned to it by the Applicant's engineers for the fullest utilization of regulated flows of approximately 7,680 c. f. s. at Roanoke Rapids during the month of highest system peak demand (December) and illustrated by Exhibit 74. For such assignment on the load, the Buggs Island outflow amount of 7,000 c. f. s. was obtained from the Army's Definite Project Report for the Buggs Island project. The additional 680 c. f. s. is the estimated **[6033]** natural inflow between the two sites. The position on the load curve illustrated by Exhibit 74, which will give maximum capacity and energy on a flow of approximately 7,680 c. f. s. is not the position which will

[4] These exhibits are numbered 79, 80, 81, and 87. Six other exhibits marked for identification as 79A, 80A, 80B, 81A, 81B, and 87A, but not received in evidence, have nevertheless been given attention but did not affect this finding and would not make it necessary or appropriate to change the finding even if they had been admitted in evidence. They were based upon the same erroneous assumption as were Exhibits 79, 80, 81, and 87 which were offered and admitted in evidence during the further opportunity—not limited as to the time to be consumed—given to the Interior in which to present its additional evidence at the further hearing held in June 1950. The rejected exhibits were presented and discussed by the Commission's permission, in Interior's latest brief.

yield maximum capacity and energy from lower flows. Thus, when this Exhibit 74 position on the load curve which was intended for the use of 7,680 c. f. s. is applied to lower flows, capacity deficiencies seem to result.[5]

However, the anticipated load requirement of the VEPCO system—a system which is [6034] supplied almost entirely by steam capacity[6]—is such that the entire system load curve is available and may be used by the new hydroelectric plant, in the selection of the best position for utilization of the available water. Applicant's Exhibit 92 shows, without dispute, the

[5] Cross-examination of Administrator Creim on this subject brought out the fact that the studies by Interior took no account whatever of the system load requirement of the applicant. When asked whether such a study could have been made, Mr. Creim said:

"Now I could sit here and make up a thousand different studies under all different kinds of assumptions and you could come up with as many load patterns as the human mind could develop. *And it goes without saying that the dispatchers will operate not only this plant, but any plant, on one part of the load curve today and on another part of the load curve tomorrow, on a consolidated system.*" [Emphasis added.]

When asked whether he had made a study to determine what, in fact, would be the energy requirements to make the 96,000 kilowatts of capacity dependable on the company's system load, Mr. Creim stated:

"No, I haven't drawn any conclusions or made any study as to that."

Further, when asked whether Exhibit 74 is a necessary measure of the load that has to be carried to be dependable on the 1953 VEPCO load for the week of annual peak load in December, Mr. Creim said:

"It is one measure. *There could be others.*" [Emphasis added.]

[6] Exhibit No. 16.

estimated December 1953 weekly system load curve (from Exhibit 29) which contains the annual system peak demand for the Virginia Electric and Power Company. The position in the system load curve which utilizes the flow to be released by the Buggs Island project (7,000 cfs) plus the tributary inflow between the Buggs Island and Roanoke Rapids sites (680 cfs) is illustrated by the cross-hatched areas[7] including the continuous generation in the base resulting from an assumed 1,000 cfs continuous release which is twice the continuous minimum release which is required for the month of December. Such position would make the total capacity carried by the proposed Roanoke Rapids plant (and the existing plant **[6035]** which will supply 5,000 kw.) equal to 96,000 kw. This Exhibit 92 further shows that there is ample space higher in the system load curve where the proposed Roanoke Rapids plant could operate to its full capacity with much less water than is required by the operation illustrated by the cross-hatched areas. A position which required less water is illustrated on this Exhibit 92 by the solid black portion in the peaks of the system load curve.[8] The evidence shows that the proposed Roanoke Rapids plant, operating under the most adverse natural December streamflow of record, could carry a portion of the system load curve similar to that illustrated on Exhibit 92 by the solid black areas, with assumed required minimum releases

[7] This portion of the system load curve was separately introduced in the 1949 hearing as Exhibit 74.

[8] A diagram representing this portion of the system load curve was separately introduced in the 1949 hearing as Exhibit 61.

of 500 c. f. s., making the total capacity carried by the proposed and existing plants equal to 96,000 kw. It is concluded that the proposed Roanoke Rapids project will be fully dependable to 91,000 kw. on the Applicant's anticipated system load under either natural or anticipated, regulated flow conditions (the latter derived from the Army's Definite Project Report), and that the Applicant's proposed project will not, therefore, receive from the Buggs Island project any increase in dependable capacity.

[6036] (41) The Flood Control Act of 1944 confers authority upon the Secretary of the Interior to sell and deliver the surplus "power and energy" generated by constructed Government projects, at the lowest rates which will meet the costs of production and transmission, and provide for amortization of that part of the Government's investment allocated to power, and, in so disposing of such "power and energy," to give preference to public bodies and cooperatives while encouraging the most widespread use of electric "power and energy" at the lowest possible rates.

(42) The Flood Control Act of 1944 does not charge the Secretary of the Interior with the duty or confer authority to provide means to supply *all* power requirements of public bodies and cooperatives, except insofar as it can be done from the surplus power available from constructed Army projects when such preference customers wish to purchase it and are able and willing to take it upon terms which meet the standards prescribed in Section 5 of the said Act; nor is authority found in Section 5 to arrange for

or provide new sources of power for new preference customer loads to be developed in the future.

[6037] (43) The evidence of record looking toward proof that the energy requirements of public bodies and cooperatives within transmission distances of power generating stations on the Roanoke River will exceed the ultimate generating capacity and energy output of the Buggs Island project at some time in future years is immaterial to any issue in this case.

(44) The evidence here is not sufficient to establish that all of the surplus power from the Buggs Island project can be sold to the preferred public bodies and cooperatives at rates consistent with sound business principles (and in accordance with the standards of Section 5) as soon as that power will be available. The full data necessary for determination of that question are not in evidence and not yet available. Likewise, the estimates and forecasts of the future extent of the preferred market for government-produced surplus energy from projects not yet authorized are uncertain and subject to question and cannot be accepted without adequate proof or sufficient factual support merely because uttered by an experienced engineer who was frank enough to characterize his study of area power requirements as a "quickie," still incomplete.

[6038] (45) The entire surplus power output of the Buggs Island project will be marketable under the terms of Section 5, Flood Control Act of 1944, when available; and the said Act requires it to be sold. The Secretary has authority to sell all of it at or near the bus bar to preference customers or to others including

private companies, so long as adequate provision is made to supply preference customers (public bodies and cooperatives) with such power as they desire whenever they are ready to purchase and receive it under the terms of the statute.

(46) It is not necessary for the Commission to pass upon the need for Government transmission facilities in order to dispose advantageously of the Buggs Island surplus power at wholesale as required by Section 5 of the 1944 Act as soon as such power becomes available.

(47) The annual load factors of public bodies and municipalities, which might be in position to purchase energy from Buggs Island, have a range of from 44 percent to 48 percent. Because of the low annual flows which must be expected, there will be years when the Buggs Island project, as shown by the Army Engineers' Definite Project Report, must operate on an annual load factor of around 21 percent to 23 percent if it is to be [6039] operated so as to obtain the greatest capacity benefits. For this reason, systems with higher than 23 percent load factor must have other sources of supply such as steam plants in order to use the Buggs Island plant at its greatest capacity value. The Army Engineers contemplate operation of that plant at only 15 percent load factor when the ultimate installation of 204,000 kilowatts is made, which will make the discrepancy even greater.

(48) The authorization to construct and acquire necessary transmission lines and "related facilities" in the Flood Control Act of 1944 cannot properly be interpreted as including authorization to construct or

acquire additional hydroelectric generating stations, even if access to such a source of additional electric energy would serve in some measure to reduce the sale price of Buggs Island power.

(49) The so-called "Memorandum of Understanding" between SEPA and the Old Dominion Electric Cooperative whereby it is contemplated that SEPA will furnish power to the Old Dominion, is not, the record makes clear, a binding contract for the sale of power from the Buggs Island project.[9] The evidence does not show that the Cooperative [6040] has secured the necessary authorization from the State of Virginia to embark upon its steam program, an indispensable element in its being able to utilize any considerable block of low-load factor energy from Buggs Island, and its application to the Virginia State Corporation Commission for such authority was denied by that agency. Further, the defense program of the Government with respect to possible control of the use of strategic materials, and the avoidance of unnecessary duplication of transmission facilities, may delay substantially the completion of the Cooperative's program, even if State authorization be later obtained. It has not been shown that licensing of the development of the Roanoke Rapids project to the Applicant, a private utility company, would have any adverse effect upon the marketing of surplus energy from the Buggs Island project within the terms and meaning of Section 5 of the Flood Control Act of 1944.

[9] Testimony of Administrator Creim.

(50) Construction of the proposed project by the Applicant would improve the reliability of power supply in the area by providing generating capacity locally, would make the area less subject to interruptions or disturbances caused by transmission line outages and would improve to some extent the voltage regulation on the [6041] Applicant's power system in that area. The Applicant's power supply is now nearly all from steam-electric generating plants, which, by this year, will have a dependable capacity of 704,300 kilowatts, plus approximately 10,000 kilowatts of dependable capacity (under adverse river conditions) from its existing hydroelectric plants. The dependable capacity of a small hydroelectric plant of the Applicant at Roanoke Rapids and now in existence, would be increased from 3,000 kilowatts to 5,000 kilowatts by construction of the proposed project so that the total dependable capacity at Roanoke Rapids would become 96,000 kilowatts. This additional capacity will be required and can be absorbed by the Applicant's system by 1953 or 1954, plus other additional capacity of some 220,000 kilowatts from additions to existing steam-electric plants.

(51) The plan for development proposed by the Applicant will require no Federal participation or appropriation for its successful completion.

(52) Construction of the project in accordance with the plans presented in this application would produce an efficient structure regardless of whether the plans [6042] were utilized by a private company or by a Federal agency.

(53) The study and investigation of the project as proposed prior to the hearing on this matter, with the additional data presented at the hearing, show that the Applicant's project as now proposed is substantially in harmony with the comprehensive plan for development of the whole river basin as contained in House Document No. 650. Such modifications of the general plan for development of the Roanoke Rapids site as have been proposed by the Applicant have been made necessary by reason of changed physical and economic conditions in the basin since 1944 and represent improvements over the original plan inasmuch as they provide a more complete utilization of the particular water resources at the site. The Applicant's proposed plans have been reviewed by the Corps of Engineers, Department of the Army, and the report of the Chief of Engineers contains a statement that the Applicant's plan is indicated by studies to be satisfactory for development of the water resources of this reach of the Roanoke River. There has been no suggestion made by the Chief of Engineers to the effect that the carrying out of the Applicant's plan would be either inconsistent or incompatible with the over-all basin plan contained in House Document No. 650 which was approved by Congress.

[6043] (54) The general plan for development of the Roanoke River Basin as set forth in House Document No. 650, 78th Congress, 2d Session, and approved by Congress in the Flood Control Act of 1944 (58 Stat. 887) constitutes the comprehensive plan for improving and developing the Roanoke River for the use and

benefit of interstate commerce, and for the improvement and utilization of water power development, and for other beneficial public uses, including recreational purposes; the project proposed is in harmony with the approved comprehensive plan and is "best adapted to a comprehensive plan" as that language is used in Section 10 (a) of the Federal Power Act.

(55) The project proposed is best adapted to the Congressionally approved comprehensive plan for improving and developing the waterway involved for the use and benefit of interstate commerce, for the improvement and utilization of water power development, and for other beneficial public uses, including recreational purposes.

(56) The concurrence by the Federal Power Commission in the recommendations of the Corps of Engineers contained in House Document No. 650, did not constitute a finding or recommendation submitted to Congress under the provisions of Section 7 (b).

(57) The record in this proceeding does not provide a proper or sufficient basis for judgment or a finding under Section 7 (b) of the Act that development of the water resources at Roanoke Rapids should be undertaken by the United States itself or for [6044] the submission of such findings and a recommendation to Congress to such effect, as provided in such section.

(58) The evidence received does not show that the Roanoke Rapids site would be developed at any time by the Federal Government, should the pending application for license be denied. Such denial would of course permit the water, which the Applicant plans at once to utilize, to continue to be wasted to the sea.

(59) The Federal Power Commission is vested by virtue of the provisions of the Federal Power Act with jurisdiction to entertain and to grant an application by a citizen of the United States, an association of such citizens, a corporation organized under the laws of the United States or any State thereof, or any State or municipality for the purpose of constructing, operating, and maintaining a dam, reservoir, power house, transmission line or any other project works necessary or convenient for the development and improvement of navigation and for the development, transmission and utilization of power across, along, from or in the Roanoke River in North Carolina at and near the town of Roanoke Rapids, North Carolina, and there has been no legislation by Congress which amends the Federal Power Act in this regard or withdraws the Roanoke Rapids site from the licensing jurisdiction of the Commission. Federal construction of the Roanoke Rapids unit of the Congressionally-approved comprehensive plan has not been authorized.

[6045] (60) No application for preliminary permit or license for a project at the same site covered by the amended application for Project No. 2009, or in conflict with the project proposed in the amended application for Project No. 2009, is before the Commission.

(61) No public lands or reservations of the United States are included in or affected by the project proposed in the application.

(62) The Applicant is a corporation organized and existing by virtue of the laws of Virginia and has

submitted satisfactory evidence of compliance with the requirements of all applicable State laws insofar as necessary to effect the purposes of a license for the proposed project.

(63) The Applicant has submitted satisfactory evidence of its ability to finance and carry to completion the project described in its application as amended.

(64) Public notice of the application and the amendment thereto has been given as required by the Federal Power Act.

(65) For the purpose of determining annual charges, the installed horsepower capacity of the project is 125,000 horsepower.

(66) The amount of annual charges to be paid under the license for the project for the purpose of reimbursing the United States for the costs of administration of Part I of the Act are reasonable as hereinafter fixed and specified.

[6046] (67) The following designated maps, plans, and specifications, filed as part of the application, conform to the Commission's rules and regulations and, subject to the condition hereinafter specified in paragraph D–(10) should be approved as parts of the license:

Exhibit J (revised), F. P. C. No. 2009–1.

Exhibit L (in 2 sheets), F. P. C. No. 2009–4, 2009–5.

Exhibit M (revised).

(68) Exhibit K has not been submitted and should be submitted within one year of the date of issuance of the license.

[6047] The Commission *orders:*

(A) The Secretary of the Interior be and he hereby is permitted to become an intervener in this proceeding; *Provided,* That such status as intervener shall relate back to and be effective as of May 12, 1949, the opening date of the hearing on this matter, and that the participation of the intervener in this proceeding since that date shall be considered as limited to matters affecting asserted rights and interests specifically set forth in his petition for leave to intervene, filed on April 25, 1949; *And provided further,* That the admission of such intervener shall not be construed as recognition that he might be aggrieved because of any order or orders entered in this proceeding.

(B) Virginia Electric and Power Company file an application under the Federal Power Act and the Commission's General Rules, for license covering its existing hydroelectric installation at Roanoke Rapids, North Carolina, within 60 days of the effective date of this order or, in the alternative, show good cause within the same period why a license under the provisions of the Federal Power Act, effective as of January 1, 1938, is not required for the continued operation of this project.

(C) This license issued to the Virginia Electric and Power Company under Section 4 (e) of the Act for a period of 50 years, effective upon the first day of the month in which this license is accepted by the Licensee, for the construction, operation, and maintenance of Project No. 2009 upon navigable waters of the United States, subject to the terms and conditions of the Federal Power Act (hereinafter referred to as the Act), which is hereby incorporated by refer-

ence and as a part of this license, and subject to such rules and regulations as the Commission has issued or prescribed under the provisions of the Act.

(D) This license shall also be subject to the terms and conditions set forth in Form L–4, entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States," which terms and conditions are attached hereto and incorporated herein by reference and made a part hereof; and subject to the following special conditions:

(1) The Licensee shall construct, maintain and operate such fish protective devices and shall comply with such special conditions in the interest of fish life as may be prescribed hereafter by the Commission upon the recommendation of the Secretary of the Interior.

[6048] (2) Except as hereinafter provided, sufficient water shall be released from the project reservoir to maintain minimum flows in the Roanoke River, as measured at the highway bridge at Roanoke Rapids, in accordance with the following tabulation. The similar flows listed for week-end requirements are predicated upon a diminished influx of pollutants:

Minimum rate of flow

Annual interval	Week day	Second-feet week end
January to April, inc	500	500
May	1,250	600
June to August, inc	2,000	1,000
September	1,600	800
October	1,250	600
November and December	500	500

The releases needed to maintain these tabulated flows shall be supplemented as necessary to provide a minimum rate of flow of 2,000 second-feet from April 1 to June 1 of each year, except as this period may be modified upon the advice of the North Carolina Wildlife Resources Commission. Modification of the period during which basic minimum flows are augmented to the 2,000 second-foot level in accommodation to annual variations in the time and duration of spawning activities of the striped bass, and in accordance with the recommendations of the North Carolina Wildlife Resources Commission, shall be limited as follows: The date of inauguration of the supplemental spawning-period flows shall not be advanced beyond March 15, nor retarded beyond April 15; the date of conclusion of the augmented spawning-period flows shall not be advanced beyond May 15, nor retarded beyond June 15; and the duration of the period of these spawning-period flows shall not exceed 75 days in any one year.

(3) The volume of controllable releases of water from the project reservoir shall not be permitted to increase to double, or to decrease to half, of any prevailing discharge in less than one hour during the spawning period of striped bass. The spawning period shall be the period from April 1 to June 1 of each year, except as modified upon the recommendations of the North Carolina Wildlife Resources Commission as provided under the preceding paragraph.

[6049] (4) The entire project area, except for such portions as may be reserved for reasons of safety and

efficient operation, shall be open to free use by the public for the purposes of fishing, hunting, and other recreational pursuits.

(5) Practical means of reducing the losses to fish and wildlife occasioned by the construction and operation of the project, of increasing the biological productivity of the project area, and of furthering its public use for recreational enjoyment, shall be devised and developed by the Licensee in cooperation with the North Carolina Wildlife Resources Commission and the United States Fish and Wildlife Service.

(6) Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the said project, the Licensee shall convey to the United States, free of cost, such of its lands and its rights-of-way and such right of passage through its dam or other structures and permit such control of pools as may be required to complete, maintain, and operate such navigation facilities.

(7) The Licensee shall furnish free of cost to the United States power for the operation of such navigation facilities, whether constructed by the Licensee or by the United States.

(8) The operation of any navigation facilities which may be constructed as a part or in connection with any dam or diversion structure built under the provisions of this license shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including the control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army. Such rules and regulations

may include the maintenance and operation by the Licensee at its own expense of such lights and signals as may be directed by the Secretary of the Army.

(9) The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation, and the operations of the Licensee so far as they affect the use, storage, and discharge from storage of waters affected by this license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interests of navigation.

[6050] (10) The applicant shall make adequate investigations of the suitability and economic feasibility of the proposed relocated Gaston site and obtain the approval of the Commission before establishing finally the height of the Roanoke Rapids pool at elevation 132 mean sea level.

(11) The Licensee shall allow officers and employees of the United States free and unrestricted access in, through, and across the said project and project works in the performance of their official duties.

(12) The Licensee shall permit the free use by the public for navigation or recreational purposes of the reservoir formed by said dam, and shall, when not inconsistent with the operation of said project, allow the construction of wharves or landings in the interest of navigation.

(13) The Licensee shall cut and remove or destroy, to the satisfaction of the representative of the Commission, all brush and trees from the area to be

submerged so that no brush or trees extend above an elevation 12 feet below the minimum pool.

(14) The Licensee will be required to operate its project in such a manner as the Chief of Engineers, Corps of Engineers, Department of the Army, or his authorized representative, may prescribe in order that the flood control and other benefits from present and future improvements under the jurisdiction of the Corps of Engineers as authorized by Congress in the Roanoke River Basin will not be nullified or substantially impaired by operation of the Licensee's project.

(15) The Licensee shall have no claim against the United States arising from the effect on the proposed project of operation of the Buggs Island Reservoir or any intervening reservoirs that may be constructed by the United States at future dates.

(16) The Licensee shall commence the construction of the project within one year after the date of issuance of the license and shall complete construction within three years of the date of issuance of the license.

(17) Subject to the provisions of Section 10 (e) of the Act and the rules and regulations of the Commission thereunder, the Licensee shall pay to the United States an annual charge, for the purpose of reimbursing the United States for the [6051] costs of administration of Part I of the Act, of one (1) cent per horsepower on the authorized ultimate installed capacity in horsepower, plus two and one-half (2½) cents per 1,000 kilowatt hours of gross energy

generated by the project during the calendar year for which the charge is made.

(E) The maps, plans, and specifications referred to in finding 67, above, are hereby approved as part of the license for the project, subject to the condition hereinbefore specified in paragraph 10 above of the special license conditions.

(F) Exhibit K shall be submitted in accordance with the rules and regulations of the Commission, to the Commission within one year from the date of issuance of this order.

(G) The license shall be accepted and returned to the Commission within 60 days from date of issuance of this order.

(H) This order shall become final 30 days from the date of its issuance unless application for rehearing shall be filed within the 30-day period provided by Section 313 (a) of the Act.

By the Commission.

LEON M. FUQUAY, *Secretary.*

Date of issuance: January 26, 1951.

[6052] In testimony of acceptance of all the provisions, terms, and conditions of the license, Virginia Electric and Power Company, this _____ day of _____, 1951, has caused its corporate name to be signed hereto by _____, its _____ President, and its corporate seal to be affixed hereto and attested by _____, its _____ Secretary, pursuant to a resolution of its Board of Directors duly adopted on the

_____ day of _____, 1951, a certified copy of the record of which is attached hereto.

VIRGINIA ELECTRIC AND POWER COMPANY,

By _____

President.

Attest:

_____

Secretary.

(Executed in quadruplicate.)

Examiner's Decision of March 17, 1950

[5420] Hampton, *Chief Presiding Examiner:* This proceeding arises upon an application for license under Section 4 (e) of the Federal Power Act, filed on October 6, 1948, by Virginia Electric and Power Company (sometimes hereinafter referred to as "Applicant" and sometimes by its popular designation: "VEPCO"). An amendment to the application was filed on April 6, 1949.

* * * * *

[5421] Two agencies of the Federal Government—the Department of the Army and the Department of the Interior—rendered reports which had been requested of them as required by Section 4 (e) of the Federal Power Act. The Army's report concerned itself primarily with navigation. Interior's report concerned itself with measures required for the protection of fish and wildlife resources since there are **[5422]** no public lands of the United States affected by the project as proposed. The Secretary of the Interior announced on January 6, 1949, that he would oppose the application. On March 22, 1949, the Commission issued an order setting the matter down for public hearing. This order framed the issues as they then appeared. Nothing presented by any party has served to change the issues substantially.

* * * * *

* * * The Secretary of the Interior also asked formally to be admitted as an intervener, and while

his petition resulted in his being given at once the full rights of participation in the proceeding, the formal status of "intervener," as such, was then denied him. A request for reconsideration of this denial was rejected by an order of the Commission issued June 22, 1949. However, a second request for reconsideration resulted in an order issued September 2, 1949, granting [5423] the application for reconsideration of the denial of the petition to intervene, and including among the matters to be decided in the final disposition of this proceeding the question of whether or not the status of intervener should be granted to the Secretary.

* * * * *

The Status of the Secretary of the Interior

Before proceeding to the issues arising from the application it appears desirable that the status of the Secretary of the Interior be determined. The Secretary points out that, by law, he is the sole marketing agent for surplus electric energy generated by projects constructed by the Corps of Engineers and it is contended that since the Roanoke Rapids project has been set aside by Congress for Federal development only (according to his view of the law), he is directly concerned with any action which might be taken on the pending application. Other and less persuasive bases for intervention have also been urged. If the project has been reserved by Congress for federal construction, as contended, the application should be dismissed forthwith for want of jurisdiction. It would appear that the Commission [5424] has con-

sidered participation in the proceeding by the Secretary as desirable and in the public interest in order that a complete record may be made on this question of jurisdiction. However, it appears that in the Secretary's opinion, the status of formal intervener has important significance with respect to judicial review under Section 313, wherein, under strictly a literal interpretation, the view has been expressed that only "parties" to a proceeding before the Commission may set in motion the machinery which could bring before a Court a grievance arising from the Commission's final determination and disposition of the case.

It should be noted that the Commission's General Rules make provision specifically for the filing of a petition to intervene by an agency of the Federal Government by defining such agencies, instrumentalities, or their duly authorized officers as "persons" and then stating that a petition to intervene may be filed by "any person claiming a right to intervene." The rules then suggest various kinds of rights or interests which may be urged in support of such petition, ending finally with "any other interest of such nature that petitioner's participation may be in the public interest."

It would appear that the Commission, by giving the Secretary the right of participation in the proceeding before it, must have felt that such participation may be in the public interest and appropriate to the administration of the statute under which this proceeding is brought, even though he might not be a necessary or indispensable party. It is considered also, upon the

record that the Secretary [5425] does have an interest sufficiently substantial adequately to support his request for the status of intervener, and it is not desired to split technical hairs either on this point or with reference to the meaning or the correct definition of the word "person." The word "person," has no rigidly fixed meaning, as viewed by the weight of judicial decisions; but when used in a statute has varying meanings depending upon contemporary conditions, the connection in which it is used and the result intended to be accomplished.

Certainly under the statute and the Commission's rules and in the circumstances of this proceeding as well as upon the evidence of his interest, there is no wish or inclination here to deny to the Secretary—a Cabinet Member—recognition as a "person" or to attempt to deny him the opportunity to have this decision reviewed by the Courts if affirmed by the Commission.

It is held both that the Secretary is a "person" within a reasonable interpretation of the Act and that he is qualified by his interest and identity formally to intervene in this proceeding. Further, the Secretary's intervention may well be in the public interest.

Whether the Secretary may be "aggrieved" by any order issued herein and whether he may succeed in obtaining court review of such order on a petition for review, are matters which will be determined by the Court to which his petition may be addressed.

Formal intervention by the Secretary of the Interior will be allowed.

[5426] *Jurisdictional Background*

The basic issues in this proceeding may be understood the more clearly if a summary is given first of the undisputed facts in the background of the jurisdictional question. The Roanoke River is an interstate stream. Rising on the eastern slope of the Appalachian Mountains and flowing in a southeasterly direction toward the Atlantic coast, it empties into Albemarle Sound. Parts of Virginia and North Carolina are included in the watershed of this river. Its basin, which includes the basin of the Smith River, is approximately 220 miles long, and from 10 to 100 miles in width. The Smith River is a tributary of the Dan River, which in turn is the principal tributary of the Roanoke. A complete description of the watershed, together with data respecting its geography, drainage, topography, geology, economic development and hydrology is contained in House Document No. 650, 78th Congress, 2nd Session. This legislative document and the legislation which preceded and followed it are indispensable source materials in the understanding (and, to a lesser degree, the disposition) of the jurisdictional issue presented by this application for license.

Congressional interest over the years in the Roanoke River has come about for two principal reasons: (1) the usefulness of the lower section for navigation and (2) the occasional floods which, by reason of their severity, have made preventive measures imperative. Projects for improvement of the Roanoke River for navigation (dredging, snagging,

and the regulation of the stream) have brought the upper limit of improvement to Weldon, N. C., 130 miles from its mouth. [5427] Weldon is approximately 7½ miles below the nearest point of the proposed project.

Before Congress undertook flood control in the Roanoke Basin, there were no large-scale flood control works by the States involved. There are yet no large-scale flood control works in the basin, but the groundwork for an ambitious program may be discerned from the several important legislative steps which have been taken.

While navigation reports on the Roanoke River date back as far as December 1871, the first report presented to Congress by the Army Engineers embracing the basin as a whole was published as House Document No. 65, 74th Congress, 1st Session, and was authorized under the provisions of House Document No. 308, 69th Congress, 1st Session. That first report, covering navigation, flood control, power development, and irrigation, concluded that while affording a potential source of hydroelectric power, a comprehensive plan for the improvement of the Roanoke River and its tributaries for navigation, and the prosecution of such improvement in connection with the development of potential power, flood control, or irrigation, was not economically justifiable at that time (1934). House Document No. 65, popularly referred to as the "308 Report," not only contained a study of all of the sites in the main stream and its tributaries which, in the opinion of the Chief of Engineers could be developed physically for flood control purposes, but

also various sites which, if the economic picture justified such development, could be utilized for the sole purpose of generation of electric energy.

[5428] In 1940 and 1942, the Committees on Flood Control and on Rivers and Harbors of the House of Representatives, transmitted to the Chief of Engineers nearly identical resolutions requesting that officer to undertake a review of the aforementioned 308 Report, with a view to determining whether any improvements in the interests of flood control and allied purposes "are advisable at this time." The requests of these Congressional committees were authorized by the Flood Control Acts approved on June 22, 1936, and June 28, 1938.

Thus we come to the report requested, published in 1944 as House Document No. 650. In this report there are the concurrences of the Board of Engineers for Rivers and Harbors, the Federal Power Commission and the Chief of Engineers in the District Engineer's report and a finding by the Board that "a comprehensive plan of improvement, consisting of 11 developments for hydroelectric power, flood control, navigation, and other uses, is economically justified and provides the best plan for the development of the water resources of the Roanoke River Basin." The 11 developments listed in the order of their priority were Buggs Island, Gaston, Roanoke Rapids, Smith Mountain, Leesville, Taber, Melrose, Randolph (on the main stream or minor tributaries) and Philpott, Stuart, and Schoolfield (on the large tributary streams). Adoption of the general plan for development and authorization of construction of the Buggs

Island and Philpott projects "generally in accordance with the plans of the district engineer, and with modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable" were recommended, and a cost [5429] figure for the over-all development was submitted. The Chief of Engineers said: "To safeguard the interests of navigation and flood control, the dams and power facilities should be constructed, operated and maintained, under the direction of the Secretary of War and the supervision of the Chief of Engineers."

Following receipt of this report and these recommendations, Congress enacted the Flood Control Act of 1944 (58 Stat. 887) which, following a lengthy statement of purpose (from which we cannot derive much aid in the determination of the jurisdictional question), included under the heading "Roanoke River Basin" the following:

Roanoke River Basin

> The general plan for the comprehensive development of the Roanoke River Basin for flood control and other purposes recommended by the Chief of Engineers in House Document Numbered 650, Seventy-eighth Congress, second session, is approved and the construction of the Buggs Island Reservoir on the Roanoke River in Virginia and North Carolina, and the Philpott Reservoir on the Smith River in Virginia, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in that report at an estimated cost of $36,140,000.

Based upon one of the authorizations contained in the Flood Control Act of 1944, the Corps of Engineers prepared a report entitled "Definite Project Report on Buggs Island Reservoir," and construction of that authorized project was undertaken and is now under way.

The Buggs Island project is a multiple-purpose development, and when completed will provide, among other benefits, needed flood control, as well as regulation of the river for navigation and [5430] sanitation. The Definite Project Report shows that in addition to performing these primary functions the Buggs Island project will have a generator capacity of 108,000 kilowatts initially and 204,000 kilowatts ultimately for the production of electric energy, the greater share of which will be available for local purchase by electric cooperatives and public bodies and utility companies in the area. There seems to be no question that because of its flow pattern which can be predicted with reasonable accuracy from past records, the Roanoke River will produce most economically what is known as low-load-factor power. Thus Buggs Island and Roanoke Rapids energy will be most usable on utility systems which have steam or other capacity to furnish firm energy for base load. The Secretary of the Interior is vested by law with the authority and responsibility of disposing of any surplus power produced at any plant in the Roanoke River Basin built by the Army Engineers. This authority, contained in Section 5 of the Flood Control Act of 1944, authorizes and directs the Secretary to dispose of such energy in such manner as to encourage the most wide-

spread use thereof at the lowest possible rates to consumers and consistent with sound business principles. Under this law, public bodies and cooperatives are preferred customers for this energy by-product of Federal dams.

Any proper development of the Roanoke Rapids site, approximately 41 river miles downstream from the Buggs Island Reservoir, unquestionably would benefit from the regulation provided by the Buggs [5431] Island project. The project at the Roanoke Rapids site as conceived by either the Army or the Applicant would be valueless for flood control and would have a negligible effect upon navigation.

* * * * *

[5432] THE ISSUES IN THIS PROCEEDING

The issues are set forth in the Commission's hearing order in this proceeding. Simply restated, they are: (1) Does the Commission have jurisdiction to issue a license to a non-Federal or private interest for hydroelectric development of the Roanoke Rapids site? (2) Is the Roanoke Rapids development one which, in the judgment of the Commission, should be undertaken by the United States itself? (3) Are the VEPCO plans for development of the water resources at Roanoke Rapids as stated in the amended application, best adapted to the comprehensive plan approved by the Congress for improving or developing the Roanoke River for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes?

As developed by the parties at the hearing and in their briefs, the jurisdictional question may be boiled down to this question: "Did Congress, by Section 10 of the Flood Control Act of 1944, reserve the development of Roanoke Rapids for the United States itself, and thus remove the project site from the licensing authority of the Commission under Section 4 (e) of the Federal Power Act?" This question has been recognized by all concerned as being the nub of the jurisdictional controversy.

Those opposing the application contend that the Federal Power Commission's letter of May 3, 1944, contained in House Document [5433] No. 650, is or has the effect of a finding and recommendation under Section 7 (b) of the Federal Power Act to the effect that the proposed project should be developed and constructed by the United States itself, and that this action by the Commission performed its function under Section 7 (b) and now deprives it of jurisdiction to approve the pending application and issue a license.

* * * * *

CONTENTIONS

The parties have aligned themselves in two groups, one group supporting and one opposing the pending application. The proponents, besides the Applicant, are two other utility companies (Carolina and Appalachian) and the Commission's staff. Opposing the granting of the application are the Secretary of the Interior and the REA Association [5434] of Virginia. * * *

The Applicant and interveners and the staff supporting the application have advanced certain contentions as follows:

1. The Commission has jurisdiction to issue a license for Project No. 2009. Section 10 of the Flood Control Act of 1944 does not preclude private development of the Roanoke Rapids site. Although, in that Act, Congress approved the comprehensive plan for the development of the Roanoke River Basin, it did not authorize Federal construction of the Roanoke Rapids project, while it did authorize and appropriate for two others of the developments proposed in the comprehensive plan. Congress was aware of its prior legislation with respect to water resources, including the Federal Water Power Act of 1920 [5435] and the Federal Power Act arising from amendments of the original Act in 1935, and there is nothing to indicate that the licensing authority of the Commission has been suspended with respect to any project not expressly authorized for construction by the United States.

2. In the circumstances presented by this application there is no sound basis for judgment and a finding by the Commission that the Roanoke Rapids development should be undertaken by the United States itself. The earliest development of the water resources at Roanoke Rapids will be achieved by the issuance of a license to the Applicant under the terms and safeguards of a Federal license because there is no way of determining when the United States would

undertake such development, or even if it would undertake such development at any time.

3. The plans of the Applicant are "best adapted to a comprehensive plan" for improvement and utilization of the water resources of the Roanoke River Basin because they are in complete harmony with the Congressionally approved basin plan. Any variation between the plans as proposed by this Applicant and the over-all basin plan as approved by Congress is very minor and actually represents an improvement in that the Applicant's up-to-date plans provide the more complete utilization of the water resources at the Roanoke Rapids site.

* * * * *

[5436] Those opposing the application have advanced these contentions:

1. The Commission is without jurisdiction to issue [5437] a license for non-Federal[1] development of Roanoke Rapids because, they allege, "Congress by section 10 of the Flood Control Act of 1944 reserved the development of the Roanoke River Basin for the United States itself" (Sec. Br. p. 11). In the 1944 Act, the Congress approved the over-all plan which included Roanoke Rapids and authorized the con-

[1] In this decision, the term "non-Federal" frequently is used interchangeably with the term "private" in the discussion of the licensing authority of the Commission. The Federal Power Act in Section 4 (e) authorizes issuance of licenses to several non-Federal classes: citizens, associations of citizens, corporations, States and municipalities. The last-named term includes cities, counties, irrigation disticts, drainage districts and other political subdivisions or agencies of the States (Sec. 3 (7)).

struction of the first two steps of the plan, in accordance with the recommendation of the Corps of Engineers which had recommended development by the United States of the eleven basin projects on a step-by-step basis, with two of the projects to be undertaken immediately. This approval of the Congress, they argue, was not a gesture lacking significance, and this legislative act, read with the approved report comprising House Document 650, shows that the Congress has preempted, for the United States, all of the sites recommended for development.

2. Concurrence by the Commission in the report and recommendations comprising House Document 650, evidenced by [5438] its letter dated May 3, 1944, constitutes a finding and recommendation by the Commission under Section 7 (b) that the development of these water resources at Roanoke Rapids should be under taken by the United States itself, and the Commission having thus performed, once for all, its function under Section 7 (b), any further action on its part at this time, not consistent with such finding and recommendation would be without authority of law and contrary to the public interest.

3. The project proposed by the Applicant, "if constructed and operated under natural stream flow conditions would have no engineering feasibility and would be economically unsound;" and the Applicant "is seeking to take advantage of the huge amounts of money spent by the United States in developing the comprehensive plan and in constructing the Buggs Island project. Even with Buggs Island in operation

the project proposed by the Applicant would still be lacking in engineering feasibility and economic soundness, unless supported by a firm contract with the Secretary of the operation of the power pool at Buggs Island so as to contribute to the benefits of Roanoke Rapids. If downstream benefits are assessed against the project proposed by the Applicant, commensurate with the benefits it would receive from Buggs Island, the ownership and operation of Roanoke Rapids by the Applicant would not be economically feasible" (Sec. Br. p. 12).

4. The Applicant "can secure its power needs either from the Government or through the construction of an equivalent steam [5439] plant with a lesser amount of investment and at lesser annual charges than through the construction of the Roanoke Rapids project. On the other hand, the benefits to be derived by the United States and the people through the common ownership and operation by the United States of the projects of the entire river basin, including Roanoke Rapids, or of Buggs Island together with Roanoke Rapids, is so much greater than those from the ownership and operation of these projects without Roanoke Rapids that they exceed the benefits which could be assessed against Roanoke Rapids if owned and operated by the Applicant. Finally, the policies of Congress and of the Secretary concerning the disposition of power from these projects must be a controlling consideration in the Commission's action on this application" (Sec. Br. pp. 12–13).

* * * * * *

[5443] DISCUSSION OF THE EVIDENCE AND CONCLUSIONS

JURISDICTION

It is concluded on the basis of all of the evidence and the record before the Examiner that the Commission has jurisdiction to entertain an application for license for construction, operation and maintenance of a hydroelectric project at the Roanoke Rapids site on the Roanoke River, and to issue an appropriate license therefor to a non-Federal or private interest.

* * * * *

The answer to the question of jurisdiction depends upon the intent of the Congress in its enactment of the Flood Control Act of 1944.

* * * The question of jurisdiction has not been altogether easy to decide because, principally, of the fact that the legislative use of terms which at times or in part have a common meaning and at other times or in part have different meanings, has not always been uniform, clear or definite as to intent. An earnest effort has been made to discover what was in the mind of the legislators and particularly with reference to whether or not it was intended to reserve, for [5444] construction by the United States itself, all the proposed units of development embraced in the comprehensive plan or only those expressly "authorized" or appropriated for. * * * In connection with the comprehensive plan submitted by the Army Chief of Engineers, for the Roanoke River Basin, Congress used the word "approved".

In connection with two multi-purpose projects in that plan, Buggs Island and Philpott, to be appropriated for, Congress used the word "authorize".

* * * * *

[5445] * * * It may be true that the Commission is without authority, in the absence of some sort of Congressional clearance, to issue a license for a project which has been "authorized," even if no appropriation has yet been made for such project. It appears far from true, however, that "approval" of a general basin plan, without authorization and without appropriation for development of certain of the sites while authorizing and appropriating for others, constitutes a preemption or reservation by Congress for federal development of those sites in the comprehensive plan approved for the basin which have neither been appropriated for nor authorized.

One looks in vain in the 1944 Flood Control Act for anything that would indicate a purpose to preclude or bar non-Federal development of water resources in the Roanoke River Basin for an indefinite number of years to come, especially where, as here, there is immediate need and market for additional capacity and energy. It must be assumed that Congress was aware at the time it enacted this Flood Control Act of 1944 that the Federal Water Power Act of 1920, passed after years of stormy debate, provided for development of the nation's water resources by non-Federal interests under the strict surveillance of the Commission and, where navigable waters were affected, under the close supervision of the Chief of Engineers, Department of the Army, as well.

The Congress it appears, gives its approval to a comprehensive [5446] basin plan for the full physical development of the water resources of a river basin for the purposes prescribed by law, so that if and when the development by the United States of any of the projects named therein appears desirable, it can act with a minimum of delay. If, in the meantime, non-Federal interests show themselves ready to undertake under Federal supervision and substantially in harmony with the approved comprehensive plan, the immediate development of any of the proposed sites not authorized or appropriated for, they may seek the necessary authorization by federal license from the agency of Congress authorized to issue such licenses, to wit: the Federal Power Commission. This seems reasonable. Development by non-Federal interests of water resources under the conditions of a license was provided for by Congress almost a quarter of a century before the enactment of this 1944 Act and this licensing statute was designed to afford maximum protection of the public interest while permitting private investment and encouraging seasonable development of needed energy from waters which might otherwise be wasted. Had Congress intended, in the 1944 Act, to suspend or withdraw the licensing powers of the Commission with respect to this basin, it could have accomplished such result easily. It has done the like before.[2]

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[2] Cf. Boulder Canyon Project Act, 45 Stat. 1057, 1062; "The Federal Power Commission is hereby directed not to issue or approve any permits or licenses under said Federal Water Power Act upon or affecting the Colorado River or any of its tributaries * * *."

[5447] A study of prior legislation has not been particularly helpful, because this precise problem (an application for a Congressionally unauthorized project within an "approved comprehensive plan") has not arisen before. Congress has, however, approved another general plan and has authorized Federal development of a portion of that plan on at least one other river—the Savannah. The legislation with respect to the Savannah is the same, for practical purposes, as the legislation with respect to the Roanoke. Of 11 approved units of a comprehensive plan for the Savannah River Basin, but one, the Clark Hill project, has been authorized. Authorization for a second unit, the Hartwell project, has been sought but has not been granted. There are no applications now pending before the Commission for license for any of the units embraced by the Savannah River plan. Two units of the Roanoke River Basin plan have been authorized as an initial step—Buggs Island and Philpott—and authorization has been sought for a third—Smith Mountain. But if approval of a comprehensive plan is tantamount to authorization by Congress—why have separate authorizations been sought for Smith Mountain and Hartwell? The answer is that Congress has yet to authorize construction of either unit in either basin and in fact has "authorized" and reserved for Federal construction only the Buggs Island and Philpott developments on the Roanoke and Clark Hill on the Savannah.

The hearings before the Committee on Public Works, House of Representatives, 81st Congress, 1st Session, on Title II of the Flood Control Act of 1949,

brought out interesting and informative material [5448] on this question. The portions of the hearings of greatest interest so far as this case is concerned are those on bills seeking authorization for the Hartwell project on the Savannah and Smith Mountain on the Roanoke, which, as has been pointed out, are units of Army-conceived comprehensive plans for the river basins involved, such over-all plans having been "approved" by Congress but only partially authorized in the same manner. * * *

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[5450] STATEMENT OF LT. COL. HERBERT C. GEE, CORPS OF ENGINEERS

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The CHAIRMAN. You were testifying about this matter under H. R. 2283 [Hartwell Reservoir on the Savannah River]. * * *

Colonel GEE. The project is a part of the approved plan, sir.

The CHAIRMAN. What do you mean by that to say, let us understand what you mean. Is not the word "approved" an authorization for the plan but without appropriation, or without an authorization for the appropriation? What is the difference between approving and authorizing a plan?

Colonel GEE. We have never construed the approval of the plan to carry with it the authorization to construct the elements of that plan.

The CHAIRMAN. Nor do we. Is it not always necessary under the Act of 1944, in order to provide for Hartwell or any other reservoir, to increase the

authorization from $36,500,000 to enough to build another dam and complete that dam? Without anything further?

Colonel GEE. That is correct, sir.

The CHAIRMAN. So that plan has this reservoir which has already been approved; is that right?

* * * * *

[5451] Colonel GEE. Yes, sir.

The CHAIRMAN. We approved the entire plan, approved all the 11 of these reservoirs and authorized Clark Hill?

Colonel GEE. That is correct, sir.

The CHAIRMAN. So all you have to do to provide for Hartwell or other dams is to increase the authorization sufficient to provide for another dam after you have completed the Clark Hill Dam.

Colonel GEE. That is correct, sir.

* * * * *

The CHAIRMAN. * * * Colonel Gee, the general plan for the Savannah River having been approved, the only thing that is necessary in order to provide for the construction of other dams and reservoirs under that plan is additional authorization and if it is desired that that authorization be applied to any one dam it can be so stated in additional authorization, is that true?

Colonel GEE. That is correct, sir.

* * * * *

Roanoke River, Smith Mountain Dam, Va.

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[5452] Mr. DAVIS. * * * Colonel Gee, will you please proceed?

Colonel GEE. Mr. Chairman, there are two bills * * * both of which are for the purpose of permitting the construction of Smith Mountain project, one of the 11 projects included in the approved plan for the development of the Roanoke River Basin. * * * Mr. Chairman, I would like to point out at this time that the authorizing of construction on the Smith Mountain project represents a deviation from the original recommendations of the Chief of Engineers when this basin plan was authorized. The reason for that deviation, as I have previously inferred, is that it is the third project.

Since the development of Buggs Island has begun, a private utility company has filed an application with the Federal Power Commission to develop the Roanoke Rapids project. This development of the Roanoke Rapids project is to be exactly in accordance with the project as recommended by the Chief of Engineers in this document. The hearings were conducted by the Federal Power Commission last week on that application. We have no information as to the outcome of those hearings. That project was the third project recommended in the original report of the Chief of Engineers.

The fourth project, the Gaston, it is believed that a private utility company will file an application for the construction of that project in the near future.

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[5454] Mr. FORD. Colonel, you have testified that one of the private power companies has made application to the Federal Power Commission for permission to install a dam at Roanoke.

Colonel GEE. Yes, sir.

Mr. FORD. And you have indicated there is a possibility that another power company will make a similar application at another authorized site.

Colonel GEE. Yes, sir.

Mr. FORD. Would those two applications not be made if there was not some possibility that the Smith Mountain Reservoir would be built?

Colonel GEE. Those applications are being filed principally because the Buggs Island Dam is under construction. They are both below Buggs Island and the greatest benefit is derived at those sites from the waters stored in the Buggs Island Reservoir. The benefits from Smith Mountain would be very small as compared with the Buggs Island benefit at the Roanoke Rapids site.

* * * * *

[5455] The CHAIRMAN. Colonel, under the Flood Control Act of 1944, the general plan, including the 11 dams, was approved and the construction of only 2 of those dams—to wit, the Buggs Island and the Philpott—were authorized at an estimated cost of $35,140,000.

Colonel GEE. That is correct, sir.

The CHAIRMAN. Now, does that not mean—that language—that any reservoirs except the two named are authorized in the Act of '44?

[5456] Colonel GEE. That language means that the general plan, including 11 reservoirs, has the approval of the Congress.

The CHAIRMAN. Does that mean—that language—that the 11 reservoirs are authorized?

Colonel GEE. No, sir.

The CHAIRMAN. I don't understand the language of the Act. I want to get that clear, because this language is a little bit unusual as compared with other language, and I want to get the construction of your office.

Colonel GEE. It has been the interpretation of our office that those two projects are the only authorized projects in the Roanoke River Basin.

* * * * *

Colonel GEE. * * * you have our recommendation as of this morning, that in view of the fact that a private utility company is now seeking to build the Roanoke Rapids Dam, and we believe a similar application will be filed on the Gaston site, that it is our feeling the Federal Government should not attempt to compete and build these straight-power projects.

The CHAIRMAN. But the fact of the matter is there has been no modification of this report, and that is the statement that you make to the committee in the light of subsequent developments.

Colonel GEE. Yes, sir.

The CHAIRMAN. And it presents a very interesting question as to whether the Government is going to build a unit and then private power build a second and a third and the Government come along and build a fourth. What is the justification for the Government to do that if those two individual units that come between are really to get a benefit that they wouldn't get if they were building those projects in the first instance?

[5457] Colonel GEE. Any benefit which they derive from the building of the multiple-purpose projects we have been discussing will have to be paid for on an annual basis by the private companies who build these projects.

The CHAIRMAN. Under what law?

Colonel GEE. Under Section 10 (f) of the law which created the Federal Power Commission and charged them with the responsibility for protecting the Federal interest and the interests of licensed private organizations concerned in hydroelectric developments throughout the Nation.

* * * * *

[5459] The statements made at the hearing before the Committee lead to the conclusion that the Department of the Army does not regard its report comprising House Document No. 650 as a recommendation that all of the units of the Roanoke River comprehensive development plan be constructed, operated and maintained by the Federal Government. The report in House Document No. 650 (like the Army's Columbia Basin Report described by General Pick) is no more than a revision of previous reports by that Department—and particularly the basic "308 Report." The original outline in House Document No. 308, 69th Congress, 1st Session, for comprehensive river basin reports—the same outline followed by the Department of the Army in the submission of all so-called "308 reports" since—unquestionably contemplates investigations and surveys the results of which may be utilized by Congress in authorizing projects, or in

requesting further studies. It is also true that the outline contemplated that the valuable engineering data contained in the "308 reports" can be utilized by non-Federal or private parties seeking to develop the water resources involved as contemplated by the Federal Power Act (i. e. under Federal [5460] license for a limited period of years with provision for recapture by the United States on fair terms at the end of the license period, if then desired). House Document No. 650 is really in substance a revised "308 report" for the Roanoke River Basin and the "approval" of Congress of the plan contained in it is no more than an expression by that body to the effect that the development of the basin whether by the United States, by private business, or by both, must be along certain general lines. Possession by Congress of such an up-to-date "308 report" is of distinct value in its determination of whether or not any of the projects embraced by the report should be undertaken with public funds.

It has been urged that the Congress could not have intended to construct the "expensive" projects and to release "cheap" projects for non-Federal development. One intervener has referred to this as a surrender by the Government of power benefits of great proportions, benefits which should be reserved by the United States for consumers, resulting, in effect, in an applicant for license being permitted to pick up and keep as its own "the apples which the United States has, at great cost, shaken from the tree." Such suggestion overlooks the fact that the United States,

like any upstream developer, is entitled to and under the Federal Power Act will receive, equitable payments for the headwater benefits received from Federal upstream construction by any downstream power producer, in conformity with a formula laid down by Congress. As we have seen, this very [5461] question occurred to the members of the Congressional Committee during the hearings (excerpts from which have been set forth *supra*). Colonel Gee reassured the Committee that such reimbursement must be made as required by law.

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[5462] The Department of the Army has reported under Section 4 (e) on the application involved herein. It has stated that its studies "indicate that the Power Company's plan proposed in the amended application is satisfactory for development of the water resources of this reach of the Roanoke River," notwithstanding the fact that it varies slightly from the exact plans for the Roanoke Rapids site contained in House Document No. 650. The plans of the Applicant, it is concluded on the whole, represent substantially, the Roanoke Rapids project as described in the House Document 650. Such difference as exists does no violence to the comprehensive plan of the Chief of Engineers as "approved" by the Congress.

* * * * *

[5464] Careful consideration has been given to the view that the Commission has already performed its function under Section 7 (b) of the Act and to the

facts and circumstances in which the Commission's letter of May 3, 1944, was written as well as to its contents. We are not able to agree with those who argue that this letter amounted to a finding and recommendation under Section 7 (b) of the Act.

True, the letter approved the comprehensive plan of the Army Engineers (with certain suggestions for design modifications), as a plan for an efficient physical development of the Roanoke River Valley for the purposes prescribed by law; but the comprehensive plan was not this Commission's plan developed from its own "examinations, surveys, reports, plans, and estimates of cost,"[3] as would have been true if the Commission had acted under Section 7 (b). And there has been no submission of a finding and recommendation to Congress by the Commission that the United States itself should undertake the development of the Roanoke Rapids site. The May 3, 1944, letter was clearly a reply to a letter from the Chief of Engineers requesting "comments." It is obvious that Section 7 (b) calls for submission of findings and recommendations directly to Congress (usually with respect to a particular or individual development for which a license is sought) and not in the form of comments on a comprehensive plan covering an entire [5465] river basin, which has been proposed by others. The Commission's letter was not addressed either to the Congress or to an officer or a Committee of the Congress. There is a presumption, which has not been overcome, that the Commission performs its function in accordance with the

[3] Quoted from section 7 (b).

directives in the laws it administers and not indirectly or covertly.

* * * * *

[5466] *Should the Roanoke Rapids Project Be Constructed by the United States Itself?*

Jurisdiction having been found, the next issue to be determined in this proceeding is whether or not upon the record in this proceeding, it should be found that the development of the water resources at the Roanoke Rapids site should be undertaken by the United States itself. * * *

* * * * *

Those opposing the pending application argue that a finding should now be made upon the record in this case that development of the Roanoke Rapids site with Federal funds would be in the public interest and that a recommendation for Federal construction should be submitted to the Congress under Section 7 (b) of the Act.

The bases of their argument seem to be (1) The Roanoke Rapids site is the most valuable of all of the proposed sites included in the comprehensive plan formulated by the Corps of Engineers, from a dollar-investment standpoint; (2) The financial success of the comprehensive plan will be jeopardized, if not doomed, if the United States releases this site for private development because, it is alleged, the benefit-to-cost ratio of the over-all plan will become so unfavorable as to discourage eventual development by the United States of the less valuable sites included in the comprehensive plan; (3) If **[5467]** a private

developer of the Roanoke Rapids site is required to reimburse the United States for headwater benefits from the Buggs Island Reservoir in accordance with the true benefits received, the Roanoke Rapids plant will be an uneconomic investment for that private developer; and (4) Payment of any headwater benefits charges of a lesser amount than a figure representing actual benefits will deprive the United States of a substantial portion of the income it is entitled to receive from the Buggs Island Reservoir, and will amount, in practical effect, to subsidizing a private corporation by the taxpayers of the United States. Such subsidy, it is alleged, is not in the public interest.

It is contended further that if the United States should build Roanoke Rapids, it would market the energy therefrom at lower rates than the Applicant would or could afford to sell it because, they assert, the Applicant's primary interest is in the welfare of its investors and the Secretary's primary interest is in the welfare of the consuming public. It is not believed that the question of the public interest can be correctly answered thus simply and dogmatically. To undertake to do so would be to ignore vital factors and obvious truths. Investors may be consumers and consumers are often investors. The public interest embraces both classes and depends not alone upon the comparative direct benefits to one group of citizens or another but also [5468] upon other effects important to our economy, our government and to the whole population.

* * * * *

[5469] It may well be that in dealing with the matter in practical fashion, it should be considered in the light of whether there is any likely probability that the Congress would, upon our recommendation, authorize appropriation of public funds for the development of Roanoke Rapids within any reasonable, foreseeable time. All arguments for recommendation for Federal development would seem to be premised upon an assumption for which no basis can be found in the record—that the United States will in fact build Roanoke Rapids within some reasonable, foreseeable time, if no Federal license is issued to a private or non-Federal applicant. The contrary appears to be the fact. The probability is that, so far as the United States is concerned, the water resources at Roanoke Rapids are destined to be undeveloped and unutilized for a long time to come. It is not believed that such wastage or nonutilization [5470] of water resources can be in the public interest, particularly when there is a need for the energy in the area and a private developer with private capital stands ready, willing, and able to utilize them, with the protection of the public interest furnished by the terms and conditions of a Federal license.

* * * * *

[5471] In passing upon this question, the realities of the situation cannot be ignored. The Commission has already expressed its view in a general way as to the desirability of development of the water resources of the Roanoke River Basin. Full development of water resources at the earliest practicable

date to meet existing and immediate future needs has ever been a firm policy of the Commission.

* * * * *

[5475] Since it is apparent that energy from the Roanoke Rapids project will not be available for many years, if ever, should this project be left undeveloped with a view to eventual construction by the United States itself, the contentions of the Secretary and of REA Association respecting the lowering of the sale price of energy to preference customers by the combining of energy from a relatively expensive project with the energy from a relatively inexpensive project seem too speculative in nature. The Secretary could not properly fix a sale price for Buggs Island energy, as matters stand now, under the assumption that Roanoke Rapids would be built by the United States even if there were no application for non-Federal construction pending. Even if non-Federal interests did not undertake the construction of any of the elements of the over-all plan, it might be as long as ten or fifteen years before Roanoke Rapids would be built. Thus, there would be no government, inexpensive energy from Roanoke Rapids to be combined with Buggs Island energy for probably as long as 10 years. In the meantime, a marked increase in construction costs might well make Roanoke Rapids energy more expensive than Buggs Island energy, from a unit-cost standpoint. Costs and benefits do not always change proportionately. Further, Buggs Island and Roanoke Rapids would belong to different construction periods.

[5476] This contention of REA Association obviously has no relationship whatever to the actual needs of the preference customers in the area for energy. Liberal estimates of the load requirements of the cooperatives and municipalities within a liberally determined economical transmission distance of the Buggs Island-Roanoke Rapids area, with or without the steam support for which funds have been made available by the Rural Electrification Administration, do not show that these cooperatives and municipalities can utilize the entire energy output of even the Buggs Island project for many years to come. Thus it seems clear that if VEPCO builds Roanoke Rapids, the preference customers in the area will not be deprived of any energy that they need or actually could use within the early or foreseeable future. Neither will they, within such period, be deprived by such event of any price advantage feasible to be gained from combining Buggs Island energy with government Roanoke Rapids energy.

It may be that some day Congress will undertake the authorization of construction of purely hydroelectric projects for the sole or special purpose of supplying preference customers with low-cost energy or to provide them low-cost sources of energy to be combined with other government power to achieve the same result. But, as matters now stand, any recommendation to Congress under Section 7 (b) must be submitted in view of *existing* law and *established* Congressional policy, against the background and in the interest of [5477] the public *at*

large, in which of course preference customers are included along with all other consumers.

The fact that the cooperatives in the area desire to become independent of any need to purchase energy from the Applicant company, the facts arising from the evidence in the record relative to reasonable and practicable transmission distances, as well as the facts and estimates of the future load requirements of the preference customers, lack determinative force standing beside the probability of no action by Congress looking to the construction or even the beginning of construction of the Roanoke Rapids project within any early period of time.

It is not felt that there is any good reason or ground for believing that the interests of the public at large would not be fully protected by the Commission's exercising its jurisdiction and issuing a license under the Federal Power Act. The existence of such ground cannot be assumed without flouting and derogating the judgment of the Congress which enacted the Federal Power Act, legislation designed to promote hydroelectric development under license the terms of which are intended to safeguard the public interest and the welfare of consumers and investors as well.

* * * * *

[5480] *Adaptability to a Comprehensive Plan Under Section 10 (a)*

The third principal issue for determination is whether this application meets the tests set forth in Section 10 (a) of the Act and the applicable regu-

lations thereunder, as heretofore interpreted and applied by the Commission.

Compliance with Section 10 (a) is always a matter initially for investigation by the Commission's staff and particularly the technical experts on the staff. Careful study and investigation of each application is pursued following its receipt, before any recommendation [5481] as to its disposition is submitted to the Commission for its judgment. The scores of applications (the greater number of which are uncontested) and kindred matters processed annually have given this organization of experts of the staff invaluable experience.

The factual and opinion testimony of these men respecting technical matters is entitled to considerable weight. It is the duty of these staff men to be impartial and to consider these questions objectively with obedience to law and protection of the true public interest as the paramount considerations. One representative of the licensed projects division of the staff, two representatives of the electrical resources and requirements division, and the chief of the bureau of power, which includes the two divisions mentioned, testified at length in the hearing on the technical and economic aspects of this matter, in support of their opinion, based upon technical engineering and economic considerations that the Applicant has presented adequate data accompanying satisfactory plans and that this application meets the standards set up by the law and by the Commission under the law, as guides for its judgment, and which have been followed through the years.

In addition to its own engineers and engineers of Stone and Webster Engineering Corporation, the Applicant presented as a witness a leading member of the firm of Charles T. Main, Inc., an engineering firm of unquestioned standing and long experience, which had designed portions of the Government's Buggs Island project and which had made an independent study of the engineering phases involved and the feasibility of the Roanoke Rapids plan from an engineering standpoint. The size of this proposed investment would make errors of judgment costly.

[5482] Upon these aspects of the proceeding, the Secretary put on as witnesses, Mr. George W. Hamilton, a very able and nationally recognized electrical engineer as well as Mr. Edward P. Eardley, Chief Engineer of the Interior Department's Division of Power, and another able engineer of the Interior's staff.

* * * * *

[5484] Certain findings and conclusions presented by the Staff with slight modifications made here by the Examiner, appear to be well supported and established by the greater weight of the evidence. These (as so changed or added to) are, as follows:

* * * * *

[5485] 4. The study and investigation of the project as proposed prior to the hearing on this matter, with the additional data presented at the hearing, show that the Applicant's project as now proposed is substantially in harmony with the comprehensive plan for development of the whole river basin as contained in House Document No. 650. Such modifications of

the general plan for development of the Roanoke Rapids site as have been proposed by the Applicant have been made necessary by reason of changed physical and economic conditions in the basin since 1944 and represent improvements over the original plan inasmuch as they provide a more complete utilization of the particular water resources at the site. The Applicant's proposed plans have been reviewed by the Corps of Engineers, Department of the Army, and the report of the Chief of Enginers contains a statement that the Applicant's plan is indicated by studies to be satisfactory for development of the water resources of this reach of the Roanoke River. There has been no suggestion made by the Chief of Engineers to the effect that the carrying out of the Applicant's plan would be either inconsistent or incompatible with the over-all basin plan contained in House Document No. 650 which was approved by Congress.

* * * * * *

6. The project proposed by the Applicant would cost approximately $27,000,000 and its annual costs would be in the neighborhood of $2,800,000. The annual value of the project's capacity and energy would range between $325,000 and $400,000 over and above annual costs, exclusive of such headwater benefits payments which will be required under the provisions of Section 10 (f) for such usable additional energy output as is fairly attributable to Federal improvements upstream from the project.

[5486] 7. The amount of the payments for headwater benefits cannot be estimated with any degree of accuracy until after the project has been placed in

operation for such time as necessary to demonstrate what actual benefits are being conferred. There has been no evidence adduced which can be accepted as establishing at this stage when the project does not yet exist, that payments for the headwater benefits to be conferred would be of such magnitude as to render the project economically infeasible for private development.

8. The proposed project would be feasible from an economic standpoint even if no upstream improvements were constructed and operated by the United States. Storage regulation which will be provided by the Buggs Island Reservoir will increase the energy output of the Roanoke Rapids project, but not the capacity.

* * * * *

11. The project proposed is best adapted to the congressionally approved comprehensive plan for improving and developing the waterway [5487] involved, for the use and benefit of interstate commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes.

In consideration of the evidence and the record, the foregoing findings and conclusions are here made by the Examiner. It has been necessary upon the evidence to reject contrary contentions after careful consideration. One of such contentions is that under natural, unregulated stream-flow conditions, i. e., without Buggs Island regulation and storage, the proposal of the Applicant would be economically infeasible. Capacity is not enough, it is urged.

The evidence in support of the rejected contention is not, on the whole, convincing, but in any event there would be little force in such a contention even if proved. We are concerned now with facts and conditions as they are, and it appears reasonably certain that the installation of Buggs Island project upstream from Roanoke Rapids will be completed soon. It is not required that an applicant shall establish economic feasibility of a proposed project under improbable hypothetical conditions or in a situation which the record shows will not exist.

Equally lacking in merit is the contention that the initiation and completion of the Roanoke Rapids project by the Applicant without a contract with the Secretary of the Interior relative to the storage and release of Buggs Island water involves an unwarranted risk of capital. In any event we cannot deny that private capital appears willing to take the risk, and the judgment of an experienced and successful utility company, [5488] willing to risk its money in the investment is entitled to weight. Nor can it properly or fairly be assumed that the Buggs Island Reservoir will be operated so as to create flow conditions at Roanoke Rapids of such a character as to impair the value of the Roanoke Rapids plant. Rather it should be assumed and can be expected that there will be friendly cooperation in the public interest between the government operating Buggs Island and private investors operating Roanoke Rapids.

There is strong engineering evidence that operation of the Buggs Island project will have to assume a pattern and that the storage and release of water

from Buggs Island will be necessarily closely related to the loads of the prospective purchasers of this energy. The load requirements of many of the preference customers are known since most of them are now being served by the Applicant's system. The engineers of the Staff and of the Applicant; it appears, have proceeded on the assumption that Buggs Island storage will be operated as efficiently and economically as possible and in accord with sound engineering practice and with appropriate cooperation and coordination by Federal and private developers for the common good. This assumption seems valid and reasonable. A contract in these circumstances is not indispensable in advance of or as a condition to the granting of license.

It is not overlooked that it has been contended that the benefits to be conferred upon Roanoke Rapids by Buggs Island storage would be so considerable that, if payment should be required in an [5489] amount comparable to the actual benefits to be received, the Roanoke Rapids plant would be economically unsound as an independent development, and would be less desirable from the Applicant's standpoint on a dollar-investment basis than would be the capacity which could be made available from a steam-electric plant. The evidence in support of this contention is not strong and is not at all convincing. It is necessarily based upon many unknown factors, among those being the actual character and amount of benefits to be conferred, and the future prices of fuel. The amount of fair and just headwater benefits charges cannot be determined now. The economic feasibility

of this project must be determined upon the assumption that the headwater benefit charges will be reasonably and equitably fixed. It is not believed that the record shows or establishes that reasonable and fair headwater benefit charges would be in an amount sufficient to render this otherwise feasible project economically infeasible.

* * * * *

[5491] *Ultimate Conclusion*

In view of the entire record, it is concluded that the pending application, as amended, of Virginia Electric and Power Company should be granted and a license issued to the Applicant authorizing it to proceed at once with the construction and operation of the proposed hydroelectric power project on the Roanoke River near Roanoke Rapids, North Carolina, subject to the special conditions provided in the order which next follows.

* * * * *

[5499] Dated this 17th day of March 1950.

FRANK A. HAMPTON,
Chief Presiding Examiner.

SUPPLEMENT TO THE EXAMINER'S DECISION OF MARCH 1950 (DATED NOVEMBER 15, 1950)

[5632] HAMPTON, *Chief Presiding Examiner:* In the further hearing held in this proceeding in June and July of this year under the Commission's order of April 27, 1950, as amended by its order of June 15, 1950, the Secretary of the Interior was permitted, in his proper turn and without limitation of time, to introduce any additional relevant and material evidence he desired to offer and was not confined to newly discovered evidence or evidence which with reasonable diligence could not have been offered in the hearing held last year. Equal opportunity was of course given to all parties, in their proper order, to present further evidence.

* * * * *

[5639] The gist of Interior's contention on the question of whether or not the Commission should find under Section 7 (b) that the Roanoke Rapids project should be undertaken by the United States, itself, is contained in one of the findings requested, to wit:

> (19) The construction of Roanoke Rapids by the Applicant would materially and adversely affect the marketing of Buggs Island power by the Secretary of the Interior, in accordance with the requirements of the law, and in accordance with the policy by him adopted, in that such power would not be available to meet the requirements of the preference

customers, and in that the power would have to be disposed of to the preferred customers at higher rates.

[5640] The contention that without Roanoke Rapids power to be combined with Buggs Island power the latter would have to be sold to preferred customers at higher rates is highly speculative and unrealistic. This contention was properly and adequately disposed of by the March 1950 decision (p. 60), and no evidence or sound reasoning has been presented since which could legitimately affect the basis of the conclusion and disposition there made, except to strengthen it. It is not deemed necessary to discuss the question further.

The allegation that if Roanoke Rapids is licensed to the Applicant its power output "would not be available to meet the requirements of the preference customers," is immaterial and beside the point, for the reason that the record is without evidence sufficient to establish or show that preference customers need Roanoke Rapids power or will need it at any early or foreseeable time. Besides, the Congress, which controls the matter, has not authorized Roanoke Rapids for Federal construction, and, therefore, has not indicated any intention to place Roanoke Rapids power in the hands of Interior to sell.

The foregoing requested finding (19) and other related findings requested by Counsel for Interior, are, it is assumed, based upon his interpretation of the scope and effect of Section 5 of the Flood Control Act of 1944, which section, the record shows, consti-

tutes the Secretary's only authority in the premises.[1] This section is as follows:

> **[5641]** SEC. 5. Electric power and energy generated at reservoir projects under the control of the War Department and in the opinion of the Secretary of War not required in the operation of such projects shall be delivered to the Secretary of the Interior, who shall transmit and dispose of such power and energy in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles, the rate schedules to become effective upon confirmation and approved by the Federal Power Commission. Rate schedules shall be drawn having regard to the recovery (upon the basis of the application of such rate schedules to the capacity of the electric facilities of the projects) of the cost of producing and transmitting such electric energy, including the amortization of the capital investment allocated to power over a reasonable period of years. Preference in the sale of such power and energy shall be given to public bodies and cooperatives. The Secretary of the Interior is authorized from funds to be appropriated by the Congress, to construct or acquire, by purchase or other agreement, only such transmission lines and related facilities as may be necessary in order to make the power and energy generated at said projects available in wholesale quantities for sale on fair and reasonable

[1] Administrator Creim of the SEPA, in his testimony, referred to Section 5 as "my very simple charter for my operations as Administrator of Southeastern."

terms and conditions to facilities owned by the Federal Government, public bodies, cooperatives, and privately owned companies. All moneys received from such sales shall be deposited in the Treasury of the United States as miscellaneous receipts.

It should be mentioned here that there has not been any question or doubt expressed in this proceeding that all of the surplus power from the initial installation at Buggs Island will be marketable as soon as it is available and to customers to whom under Section 5, the Secretary is authorized to sell and deliver it. Indeed, the Applicant has expressed a desire to purchase all or as much of the Buggs Island as can be sold to it.[2] It is probable that all of the surplus power to be produced could be sold and delivered, with **[5642]** advantage to the Government and to consumers, at or near the bus bar. Exhibit 21, which was not challenged, shows that the high voltage transmission lines of at least two major utility systems are so close to the Buggs Island project that power from that project could be taken by them without installation of additional transmission facilities. This manner of disposal with a reasonable and satisfactory "wheeling" arrangement to assist in supplying preference customers' needs, would probably render unnecessary a congressional appropriation which would have to be obtained before transmission facilities could lawfully be built or acquired under the Flood Control Act of 1944.

[2] Testimony of A. Holtzclaw, President of the Applicant Company.

The provision of Section 5 of that Act that "preference in the sale of such (here, Buggs Island) power and energy shall be given to public bodies and cooperatives," clearly appears to mean that when a quantity of surplus Buggs Island power is available for sale, and there are public bodies and cooperatives in a position to purchase and who offer to purchase any or all of this available power, such applicants shall have first call over others, provided their proposed purchase contracts meet the standards set in Section 5. These standards, by the words of the statute, must be met by *all* purchasers, preference customers and others alike. We must consider the language of Section 5 as it is, regardless of any opinion as to whether or not its scope and effect should have been made broader or narrower. Applied to the instant case, Section 5 serves to authorize the Secretary of the Interior to sell and deliver to certain classes of **[5643]** customers named in the Section such surplus power as may be produced at the Buggs Island Government project; to give preference to certain of those classes in disposing of such surplus power; and, if necessary in order to dispose of it on terms that will meet production and transmission costs and recover the the Government's investment, to seek appropriation of public funds to build or acquire essential transmission lines. However, Interior Counsel's interpretation of the authority given the Secretary, as indicated by the evidence offered in the 1950 further hearing, seems to go much farther and to consider that the Secretary's duty and authority under the Flood Control Act of 1944

are not merely to sell and deliver the surplus power and to give public bodies and cooperatives preference over privately owned companies when both are attempting to purchase surplus power from Government projects, but also that the Secretary must provide and deliver *all* the power that preference customers within transmission distance may require now or in the future, provide also new sources of power to meet prognosticated future demands of expected preference customers and, even further, to arrange for future preference loads to create additional demands. But we are not able to find in Section 5 of the Flood Control Act of 1944 words sufficient to confer such authority.

However desirable such a provision might be thought to be, the Congress has not charged the Secretary of the Interior with the duty or authority to meet and satisfy all present and future demands of preference customers. Neither is the authority given him to provide new Federal projects [5644] for such purpose.

The reports of the Committee of Congress upon the Flood Control Bill which became the Flood Control Act of 1944, as well as the Congressional debates upon the Bill, make it clear that it was not the legislative intent to confer upon Interior any power or duty to affect or influence the construction of the projects in the Army's Comprehensive Plan. Representative Whittington, Chairman of the House Committee on Flood Control, explained in the debate [3] that Interior,

[3] Congressional Record, December 12, 1944, p. 9287.

under the Bill (now the Act) "has no authority whatever with respect to the construction." He also stated, "We have said that the matter of power is to be passed on by the Chief of Engineers and by the Federal Power Commission * * * I may say in reply to the gentleman's question that the Secretary of the Interior has no control whatever over the construction of any dam under the control of the War Department." At another point in the debate, Mr. Whittington repeated, with reference to the Secretary of the Interior: "He has no power whatever with respect to building and construction, and his power is limited only to the sale and transmission of the excess power generated at dams authorized and constructed by the War Department." The report of the Senate Committee upon the Bill contains the following:

> The committee desires an amendment which provides a convenient and practical method of disposing of power at projects under the control of the War Department without setting up a public power trust which would be unduly competitive with established private power [5645] utilities. The committee, therefore, has inserted a proviso [now Section 5 of the Act] which authorizes the Secretary of the Interior to construct and acquire only such transmission lines or related facilities as may be necessary in order to make the power and energy generated at such projects available in wholesale quantities for sale on fair and reasonable terms and conditions to facilities owned by the Federal Government, public bodies, cooperatives,

> and privately owned companies. The committee recognizes the desirability of granting preferences in the sale of such power and energy to public bodies and cooperatives when the power is generated at projects financed by the Federal Government.[4] [Matter in brackets, supplied.]

Chairman Whittington of the House Committee stated further, in the House debate.[5]

> Many projects have been proposed under the guise of public works, but every proposal should be studied and tested. They should meet the requirements of sound public works. First, the project should have practical utility. Second, it should be economically sound. Third, it should be of the type that cannot compete with any facilities that can be provided through private enterprises. Federal public works should not conflict with private works and local public works * * *

It is true that Section 5 imposes upon the Secretary the duty to dispose of the surplus power "in such a manner as to encourage the most widespread use thereof at the lowest possible rates to consumers, consistent with sound business principles, the rate schedules to become effective upon confirmation and approval by the Federal Power Commission," but this, it is believed, is wholly insufficient to authorize or require Interior to arrange to satisfy all future needs of preference customers or to build or acquire transmission lines **[5646]** with public funds when no

[4] Sen. Rep. No. 1030, 78th Cong., 2nd Sess. (1944).

[5] 90 Congressional Record 4122 (1944).

Govenment transmission lines are actually necessary to effect the sale and delivery of the surplus power to any of the approved groups according to the standards prescribed and when the demands of preference customers can be supplied directly or by a satisfactory wheeling arrangement.[6]

It appears certain that Interior is not by law authorized or required to concern itself in respect of the potential output of sites not yet authorized for Federal construction on the Roanoke River. It must be and is concluded that the evidence introduced by Interior, with its forecasts, assumptions, and meager and insufficient facts respecting future requirements of possible or expected preference customers for power over and above the amount ultimately to be available for sale to them at the two sites (Buggs Island and Philpott), authorized and appropriated for by the Congress for Federal construction, is not material to the question of whether or not VEPCO should be permitted, under Federal license and regulation, now to develop power from presently unutilized waterflow at Roanoke [5647] Rapids. Even though it could be established at this time that by 1960 the load of

[6] It is interesting to note SEPA Administrator Creim's statement on cross-examination that "The Act says specifically what the Secretary shall do" and "It authorizes the Secretary to construct transmission lines when it becomes necessary to get this power to the customers."

It is interesting also to note that it is in evidence that Interior, under authority of the Flood Control Act of 1944, is even now selling all the surplus power from the Government's multiple-purpose Allatoona project on the Etowah River in Alabama to a private utility company under a contract which provides for supplying the needs of preference customers.

public bodies and cooperatives within economical transmission distances will have grown to such an extent as to be sufficient to absorb the surplus power of Buggs Island, Philpott, and Roanoke Rapids, that fact would be immaterial here, the Congress having chosen to appropriate for, and authorize Government development of, only two of the sites embraced in the comprehensive plan and not having chosen to authorize or appropriate for Government development of the Roanoke Rapids site which would be a purely power project and not a multiple-purpose project.

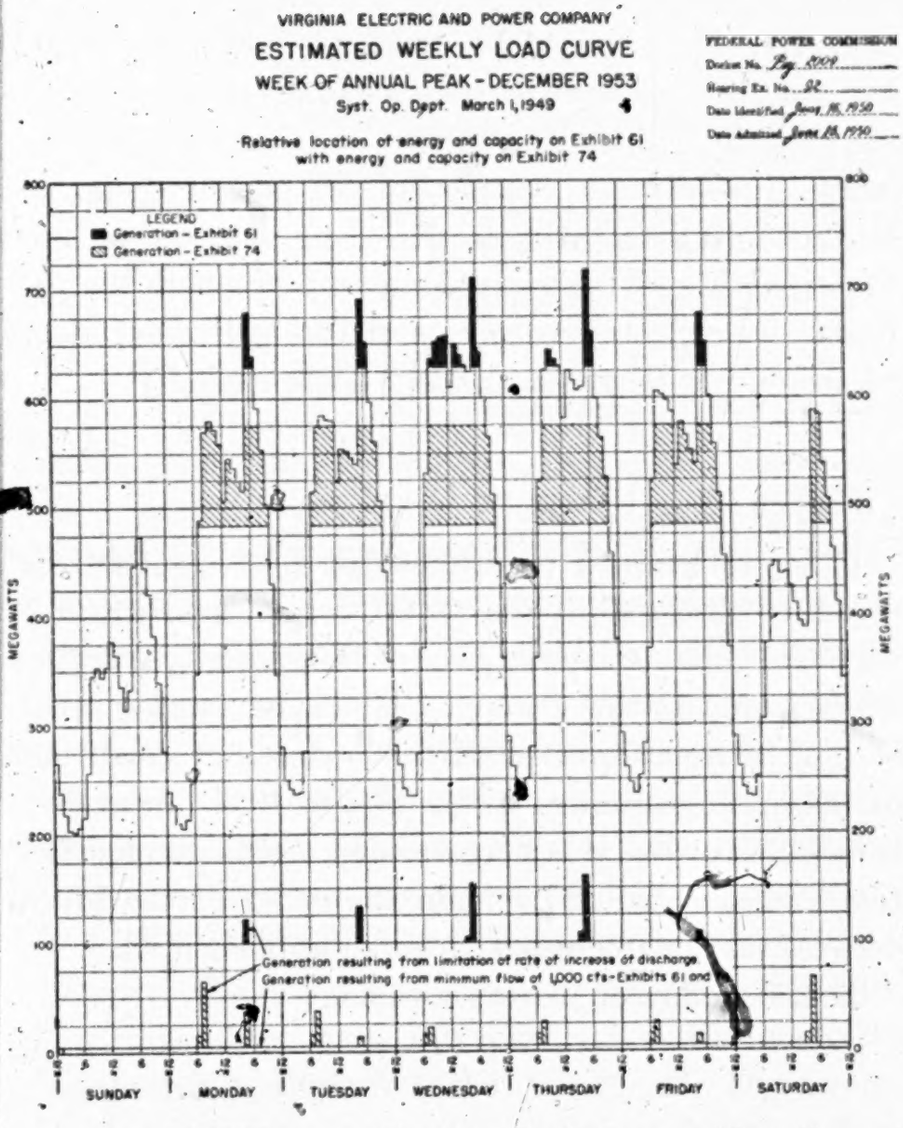
And, even if the words of Section 5 of the Flood Control Act of 1944 warranted a broader interpretation than is here given them, the evidence introduced on the subject of future power requirements of widely scattered possible future preference customers would not be sufficient to establish the contention that Roanoke Rapids power is a necessity to the successful marketing, under the terms of the statute, of the power from the Buggs Island project or is necessary to supply the needs of preference customers. The testimony of the recently appointed Administrator of SEPA shows clearly that at the time he testified (and no doubt because of the very short time which had elapsed since his new office had been opened), he was just coming to grips with the problem of marketing in the area. He had made no contracts for the sale of any part of the Buggs Island power to come from the initial installation. He could not say with any certainty how many cooperatives and public bodies would want and could use any [5648] of the Buggs Island output. The "Memorandum of Understand-

ing'' with the Old Dominion Cooperative, the evidence shows, was entered into upon the understanding that the cooperative would be able to embark on its steam program and would construct its own transmission grid. This matter has not been settled so far as the record shows. The Administrator, who had opened his new office less than three months preceding his testimony here and without the assistance of a full staff, lacked information which would enable him to say how many municipalities with or without small steam or diesel generating stations would desire to become a part of the projected SEPA power grid under such contractual provisions with respect to resale rates as Interior may feel it should insist upon.

The Administrator had not been furnished with usable estimates of the power requirements quantitatively, of any potential customer (other than VEPCO), and while he did have certain hastily gathered information as to the capacities involved, such information is meager and furnishes no sufficient basis for a conclusion as to the shape of the potential customers' load curves. The Administrator, himself, manifestly an able engineer, on the witness stand frankly characterized the study he and his staff had made of regional power requirements for the purpose of this proceeding, as a "quickie" study, still incomplete. The evidence introduced on the subject is insufficient to show that Roanoke Rapids power, in addition to Buggs Island and Philpott surplus power, could be utilized by or is required for preference customers' loads even if we should assume that the Secretary under [5649] Section 5 is required to undertake to fill

all of the present and future needs of preference customers in the area. Further, the evidence here fails to show that preference customers will be able to take and absorb all of even Buggs Island's salable output for years to come.

In its brief, Interior again has requested that a finding be made to the effect that if the Roanoke Rapids project is built by the Applicant with a pool elevation of 132 feet instead of 127 feet, such construction will adversely affect the Gaston project. Gaston is another of the straight hydroelectric sites in the comprehensive basin plan, which (like the Roanoke Rapids site) has not been authorized, appropriated for or reserved by the Congress for Federal construction. Interior offered no evidence in the 1950 further hearing which would support such a finding or cast doubt upon the testimony by Witness Strandberg, for the Applicant, who testified to the effect that relocation of the Gaston site would not affect the benefit-to-cost- ratio for the Gaston site. The Applicant's exhibits show that the power values to be gained by operating the Roanoke Rapids project at Elevation 132, rather than at Elevation 127, will more than offset any loss of value from lowering the net head available at Gaston, considering the matter on the basis of the total maximum power values to be obtained from the water resources at the two sites. Paragraph "(C) (x)" of the order in the March 1950 decision calls for further study to be made by the Applicant and for approval of the Commission to be obtained, before the height of the Roanoke Rapids pool may be established finally at Elevation 132 mean sea level. The evidence does not indicate any [5650] necessity for further consideration at this time of the effect of the Applicant's proposed project upon the undeveloped and unreserved Gaston site which, the record shows, may, in fact, be moved a short distance upstream to a probably better site which will cost less to develop.



Interior also contends that the economic feasibility of the proposed Roanoke Rapids project should be based on the cost of a steam plant of 72,000 kw. rated

capacity, which might be overloaded to carry 91,000 kw. for short periods of time. However, the evidence shows that Applicant's Exhibit 15, on economic feasibility, including a comparison of steam costs and Roanoke Rapids hydroelectric costs, was based upon the *capability* of the generating units for both the proposed hydroelectric project and the equivalent steam program, not on rated or name-plate capacity.

* * * * *

[5673] ULTIMATE CONCLUSION

Upon the record as augmented by the additional evidence received in the 1950 further hearing, it is concluded that a license should be issued to Virginia Electric and Power Company, upon its pending application, in accordance with the terms and conditions of the order contained in the March 1950 initial decision which order, it is here decided, needs no modification and shall be and remain the order of the initial decision as such decision is here supplemented.

This 15th day of November 1950.

FRANK A. HAMPTON,
Chief Presiding Examiner.

[3541] EXHIBIT 1

LETTER OF THE CHIEF OF ENGINEERS, UNITED STATES ARMY

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, May 22, 1944.

The Chairman, Committee on Flood Control, House of Representatives, Washington, D. C.

MY DEAR MR. CHAIRMAN: 1. The Committee on Flood Control of the House of Representatives, by resolution adopted August 28, 1940, requested the Board of Engineers for Rivers and Harbors to review the report on the Roanoke River, Va. and N. C., as contained in House Document No. 65, Seventy-fourth Congress, first session, with a view to determining whether any improvements in the interests of flood control and allied purposes are advisable at this time. Under date of January 26, 1942, the Committee on Rivers and Harbors of the House of Representatives requested the Board of Engineers for Rivers and Harbors to review the reports on the Roanoke River, Va. and N. C., as contained in House Document No. 65, Seventy-fourth Congress, first session, with a view to determining whether any improvements are advisable at this time. I enclose the report of the Board in response thereto. It is also in review of reports on surveys of reservoirs in Roanoke River, N. C., authorized by the Flood Control Act approved June 22, 1936, and in review of the reports on sur-

veys of Smith River and its tributaries, Virginia and North Carolina, authorized by the Flood Control Act approved June 28, 1938.

2. The Board, concurring in general with the district and division engineers, finds that a comprehensive plan of improvement, consisting of 11 developments for hydroelectric power, flood control, navigation, and other uses; is economically justified and provides the best plan for the development of the water resources of the Roanoke River Basin. It recommends improvement of the Roanoke River and tributaries for flood control, navigation, the generation, transmission, and sale of hydroelectric power and for other beneficial uses by the construction of dams and hydroelectric power plants at Buggs Island, Gaston, Roanoke Rapids, Smith Mountain, Leesville, Taber, Melrose, Randolph, Philpott, Stuart, and Schoolfield, generally in accordance with the plans of the district engineer and with modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, at an estimated cost of $124,000,000 for construction and $657,800 annually for operation and maintenance, the initial step to consist of the construction of dams and hydroelectric power plants at Buggs Island and Philpott at an estimated cost of $36,140,000 for construction with $164,100 annually for operation and maintenance, and the other units of the plan to be constructed progressively at such rates as future developments may indicate desirable.

[3542] 3. The reports of the Board of Engineers for Rivers and Harbors and of the district and

division engineers were referred to the Federal Power Commission for comments. In its reply, copy of which is herewith, the Commission states that it concurs in general with the Board. It suggests that consideration be given to the installation of crest gates in the spillways at the Smith Mountain, Randolph, Stuart, and Schoolfield developments and to the raising of the gates at the Leesville, Taber, Melrose, Buggs Island, Gaston, and Roanoke Rapids developments. The Commission states that the suggested alterations would permit an increase in the total installed capacity from 357,800 kilowatts to about 428,000 kilowatts.

4. After due consideration of these reports and the comments of the Federal Power Commission, I find that the comprehensive plan as recommended by the Board provides for optimum development of the water resources of the basin. The authorization should be broad enough to permit the changes suggested by the Federal Power Commission, if found advisable when construction is initiated. To safeguard the interests of navigation and flood control, the dams and power facilities should be constructed, operated, and maintained under the direction of the Secretary of War and the supervision of the Chief of Engineers.

5. I accordingly recommend that the general plan of development outlined in the report of the district engineer be adopted as the basis for improvement, step by step, of Roanoke River and tributaries for flood control, navigation, and other purposes, and that the Buggs Island and Philpott projects be author-

ized for construction as the initial step, generally in accordance with the plans of the district engineer and my comments herein and with modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, at an estimated cost of $36,140,000 for construction and $164,100 annually for operation and maintenance.

Very truly yours,

E. REYBOLD,
Major General, Chief of Engineers.

[3542]

APPENDIX C

FEDERAL POWER COMMISSION,
Washington, D. C., May 3, 1944.

Maj. Gen. EUGENE REYBOLD,
Chief of Engineers, War Department,
Washington, D. C.

DEAR GENERAL REYBOLD: This is in response to your letter dated February 14, 1944, forwarding copies of the reports of the district and division engineers, and of the Board of Engineers for Rivers and Harbors on the Roanoke River, Va. and N. C., and requesting comments of the Commission thereon.

The Board recommends improvement of the Roanoke River and tributaries for flood control, navigation, the generation, transmission, and sale of hydroelectric power, and for other beneficial uses, by the construction of dams and hydroelectric power plants at Buggs Island, Gaston, Roanoke Rapids, Smith Mountain, Leesville, Taber, Melrose, [3543] Randolph, Philpott, Stuart, and Schoolfield, in general accordance with the plans of the district engineer with such

modifications as may be advisable, at an estimated cost of $124,000,000. The aggregate installed capacity at these 11 projects would be 386,300 kilowatts, and on the average the generation of electric energy would amount to 1,695,200,000 kilowatt-hours annually, of which 1,299,700,000 kilowatt-hours would be primary energy. The average cost of generation would be 2.91 mills per kilowatt-hour and the ratio of benefits to cost for the complete development has been estimated at 1.47.

The Board believes that it would be advisable, in order to insure the best service in the area, that provision be made to construct, operate, and maintain transmission lines, substations and facilities, and structures appurtenant thereto, as may be found necessary for the transmission, interchange, and sale of energy.

As an initial step in this improvement the Board recommends the construction of the large Buggs Island and the Philpott projects, both including power, at an estimated cost of $36,140,000. The initial installation at these projects would aggregate 94,500 kilowatts, and on the average the generation of electric energy would amount to 455,000,000 kilowatt-hours annually, of which 300,000,000 kilowatt-hours would be primary energy. The cost of energy at the Buggs Island project is estimated at 3.04 mills per kilowatt-hour, and at Philpott 4.05 mills. The ratios of benefits to costs are estimated at 1.35 and 1.30, respectively.

In response to the letter dated May 5, 1942, from your office the Commission, by letter dated July 23, 1943, transmitted to you its comments with respect to

the proposed large Buggs Island project and raised the question as to whether it would be advisable to develop the head available at the Buggs Island site by the construction of two smaller dams. The thoroughness with which your Department has gone into this question and has presented the results of the further studies along these lines in the comprehensive report now under consideration is appreciated.

Reviewing further the Commission's previous views with respect to the development of the Roanoke River Basin, the Commission by letter to you, dated November 10, 1943, agreed with the Board that the proposed Philpott multiple-purpose project, with modifications that may later prove to be desirable, would be an essential unit in the comprehensive development of the Smith and Roanoke River Basins.

The Commission staff has continued its studies of the Roanoke River Basin in cooperation with representatives of your Department and concurs in the conclusion of your reporting officers that the Buggs Island project should be constructed substantially as recommended by them. The staff is also of the opinion the Buggs Island project and the previously recommended Philpott project taken together would comprise a desirable initial step in the development of the basin, and would afford substantial flood control benefits in the lower Roanoke River and along the Smith River, respectively, in addition to making it possible to develop a substantial block of low-cost hydroelectric power.

As proposed by the district engineer, the Philpott, Smith Mountain, Randolph, Stuart, and Schoolfield

Reservoirs would not have gated spillways. The Commission staff believes that crest gates should be [3544] installed on the spillways of all of these projects, except Philpott, for the purpose of providing controlled flood storage and greater power storage with resulting increases in the benefits from both flood control and power. The staff also believes that it would be desirable to raise the top of the gates proposed by the district engineer on the Leesville, Taber, Melrose, Buggs Island, Gaston, and Roanoke Rapids projects in amounts varying from 2 to 5 feet for the same reasons; and that the Stuart project should be constructed to the higher level considered by the district engineer.

With the modifications suggested by the staff, the initial installed capacity for the entire development would be increased from 357,800 kilowatts, exclusive of the proposed spare unit at Buggs Island, to about 428,000 kilowatts, and the average annual energy output would be increased to about 1,795,000,000 kilowatt-hours. The primary energy would be increased from 1,229,700,000 kilowatt-hours to about 1,450,000,000 kilowatt-hours. The staff reports that the cost of these modifications would be relatively small and well justified by the additional flood control and power benefits.

A study of available maps and survey records reveals that there are additional dam and reservoir sites in the Roanoke River Basin which will merit investigation at some future date. These are the Walnut Cove site on the upper Dan River above Pine Hall, N. C.; the Anglins Mill site on the Mayo

River, a tributary of the upper Dan River; the Carr Ford site on the Pigg River, a tributary to the upper Roanoke River; sites on the Banister River, a tributary of the Dan; and on the Hyco, also a tributary of the Dan. The first two of these are above the Schoolfield Reservoir and the third is above the Randolph Reservoir. Projects on the Hyco and Banister Rivers would have an effect only on the Buggs Island project and the lower river.

Based upon the consideration given hereinbefore, and upon careful review of the reports of your Department, the Commission concurs in the conclusion of the Board of Engineers for Rivers and Harbors that the comprehensive development of the Roanoke River Basin, in general accordance with the plans prepared therefor by the district engineer consisting of 11 dam and reservoir projects with power, is desirable and that the Buggs Island and Philpott projects would constitute a desirable initial step in the development of the Roanoke River Basin. The Commission believes that the power which could be produced at the Buggs Island and Philpott projects could be absorbed and profitably utilized in the postwar period within a reasonably short time following their construction and that plans, therefore, for these two projects should be prepared with the view to their construction in the early postwar period.

The Commission also recommends that careful consideration be given to the suggestions of its staff for the modifications outlined herein, including the installation of gates at ungated spillways and the increase in the height of spillway gates where now

proposed. The Commission will be glad to have its staff confer with representatives of your Department in this and in other matters having to do with the details of the development of this basin.

Sincerely,

LELAND OLDS, *Chairman.*

[3545] REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

WAR DEPARTMENT,
THE BOARD OF ENGINEERS,
FOR RIVERS AND HARBORS,
Washington, February 7, 1944.

Subject: Roanoke River, Va. and N. C.
To: The Chief of Engineers, United States Army.

* * * * * *

[3547] 6. The district engineer has made a comprehensive survey and has investigated all practical means of improvement. He finds that the most desirable plan for improvement, which would provide for the full utilization of the potentialities of Roanoke River Basin, consists of construction of 11 multiple-purpose projects for flood control, power development, and other uses as described in his report. Data for the plants, if constructed and operated as a whole, are contained in the table below. This table is based upon generator capacities sufficient to produce the prime power at 50-percent load factor and evaluation of the power at generator voltages, on the basis of the cost of producing similar power by privately owned steam plants. The developments are arranged in the order in which the district

engineer believes that they should be undertaken. Data given are for the individual units in the ultimate plan except that the annual costs and power values represent the increases in the annual costs and annual power values which would result to the power system from the addition of the individual development to the preceding plants.

Developments listed in order of proposed construction	Buggs Island	Gaston	Roanoke Rapids	Smith Mountain	Leesville	Taber
Stream	Roakoke	Roanoke	Roanoke	Roanoke	Roanoke	Roanoke
Location (miles above mouth)	178.7	141.9	137.5	314.2	293.7	275
Drainage area (square miles)	7,800	8,329	8,395	1,020	1,497	2,249
Height of dam (feet)	149	108	79	244	95	54
Net average power head (do)	97	71	39 and 89.5	159.3	63.5	33.5
Useful power storage (acre-feet)	1,175,000	59,000	7,100	520,000	2,800	5,500
Controlled flood storage (do)	416,000					
Installed capacity (kilowatts)	114,000	54,000	58,000	33,000	16,000	10,000
Annual prime output (1,000 kilowatt-hours)	321,200	235,300	256,900	84,100	42,100	29,600
Annual secondary output (do)	121,600	92,800	121,300	4,300	9,500	11,400
Total annual output (do)	442,800	328,100	378,200	88,400	51,600	41,000
Construction cost (1,000 dollars)	31,730	12,280	11,630	11,060	3,540	3,380
Construction cost of transformers, transmission lines, and substations (1,000 dollars)						
Total construction cost (1,000 dollars)						
Annual charges (dollars, exclusive of transmission costs)	1,455,500	601,200	571,200	583,800	173,500	162,200
Value of power in system (dollars, at generator voltages)	1,758,900	1,390,700	1,481,600	594,800	234,100	175,700
Benefits to existing downstream plants (dollars)						
Flood-control benefits (do)	207,000			10,000		
Total benefits (do)	1,965,900	1,390,700	1,481,600	604,800	234,100	175,700
Ratio benefits to costs	1.35	2.32	2.60	1.04	1.35	1.08

[3548]

Developments listed in order of proposed construction	Melrose	Randolph	Philpott No. 4	Stuart	Schoolfield	Total
Stream	Whipping	Roanoke	Smith	Smith	Dan	
Location...miles above mouth	1.0	227.8	44.3	5.3	67.0	
Drainage area...square miles	2,389	2,982	212	534	1,890	
Height of dam...feet	96	147	214	138	126	
Net average power head...do	104.0	53.2	164.6	94.7	75.2	
Useful power storage...acre-feet	111,500	150,000	133,500	85,000	100,000	2,229,400
Controlled flood storage...do			34,000			450,000
Installed capacity...kilowatts	34,500	24,000	9,000	9,000	24,000	386,300
Annual prime output 1,000 kilowatt-hours	94,200	59,600	22,400	27,400	86,900	1,229,700
Annual secondary output...do	39,400	26,900	1,200	6,800	30,300	465,500
Total annual output...do	133,600	86,500	23,600	34,200	87,200	1,695,200
Construction cost...1,000 dollars	8,800	8,370	4,670	3,600	9,350	109,400
Construction cost of transformers, transmission lines, and substations...1,000 dollars						14,540
Total construction cost...do						123,940
Annual charges (dollars, exclusive of transmission costs)	425,700	403,000	227,800	173,400	446,000	5,223,300
Value of power in system dollars, at generator voltages	566,400	387,200	145,700	173,000	373,300	7,281,400
Benefits to existing downstream plants...dollars			21,000	7,000	4,000	32,000
Flood-control benefits...do			160,000	2,000		379,000
Total benefits...do	566,400	387,200	326,700	182,000	377,300	7,692,400
Ratio benefits to costs	1.33	.96	1.44	1.05	.84	1.47

The district engineer reports that with the exception of a flood-control reservoir at Philpott on Smith River, improvement solely for flood protection is, in general, not justified in the Roanoke River Basin, but that construction of the comprehensive plan outlined in his report consisting of eight multiple-purpose projects on the Roanoke River, two on Smith River, and one on the Dan River, at an estimated cost of $124,000,000, which provides for an orderly development of the water resources of the entire basin, is justified by the estimated probable benefits from power production, flood control, and regulation of stream flow. It provides ultimately for the installation of 386,300 kilowatts of additional hydroelectric

generating capacity; would eliminate 84 percent of the estimated average annual future flood damages to existing property along the Roanoke, Dan, and Smith Rivers; and would provide sufficient regulated flow to permit extension of navigation facilities from the present head of navigation at Palmyra to Weldon, N. C., by the construction of one lock and dam at river mile 114 on the Roanoke River. The ultimate annual output of electrical energy during an average year would be 1,229,700,000 kilowatt-hours of prime energy and 465,500,000 of secondary, a total of 1,695,200,000 kilowatt-hours. The average unit cost at the generators would be 3.90 mills for prime energy, 0.30 mill for secondary energy, and 2.91 mills for the total output. The estimated average annual cost for the entire plan, exclusive of transmission facilities, is $5,223,300, which is in comparison with the total estimated average annual benefits of $7,692,400, gives an over-all benefits-to-cost ratio of 1.47.

7. Investigations by the Federal Power Commission indicate a need for large blocks of additional energy in the near future to supply the growing demand in the industrial areas contiguous to the Roanoke River Basin. The Buggs Island project on the lower Roanoke River and the Philpott No. 4 project on the upper Smith River are advantageously located to supply energy to partially meet this need. If constructed, they would also provide the major portion of all flood control [3549] of the entire comprehensive plan. The estimated cost of construction of the two projects as the initial step in the comprehensive plan is $30,900,000 for Buggs Island

and $5,240,000 for Philpott No. 4, with annual costs, exclusive of transmission facilities, of $1,455,500 and $227,800, respectively. The estimated average annual benefits are $1,965,900 and $296,500, which gives benefits-to-cost ratios of 1.35 and 1.30. The district engineer concludes that the construction of the entire comprehensive plan for the Roanoke River Basin as outlined in his report should be approved, and that the Buggs Island and the Philpott No. 4 projects should be selected for early construction as the initial step in carrying out the plan. He accordingly recommends the adoption of the comprehensive plan proposed in his report for the orderly development of the water resources of the Roanoke River Basin at an estimated first cost of $124,000,000 with $657,800 annually for operation and maintenance, and that the construction, maintenance, and operation of the Buggs Island project on Roanoke River, and the Philpott No. 4 project on Smith River, be authorized in the near future at such time as the present shortage of critical materials has been alleviated at estimated first costs under normal conditions of $30,900,000 and $5,240,000, respectively, with $134,500 and $29,600 annually for operation and maintenance. If adopted for construction during the present war, he believes that the cost of construction would be increased by 10 percent. The division engineer concurs.

8. Local interests were informed of the nature of the division engineer's report and given an opportunity to submit additional information for consideration by the Board. All communications received have been carefully considered.

VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

9. The Board concurs generally in the views and recommendations of the reporting officers. The comprehensive plan of improvement, consisting of 11 developments for hydroelectric power, flood control, navigation, and other uses, provides the best plan for the development of the water resources of the Roanoke River Basin. The estimated Federal construction cost, including transmission facilities, is $124,000,000, and the annual cost of operation and maintenance $657,800. Estimated annual charges, exclusive of transmission facilities, are $5,223,300 and the estimated annual benefits $7,692,400, which indicate that the plan is justified economically. The benefits include $379,000 for flood control and $32,000 for increased output at existing downstream plants. The output of the proposed new developments is 1,229,700,000 kilowatt-hours of primary and 465,500,000 of secondary energy per year. If power is charged with its proportionate part of the annual cost, the average cost of production of energy is 2.91 mills per kilowatt-hour.

10. Due to the flood protection that would be secured, and the imminent requirements for additional generating capacity, the Board is of the opinion that the Buggs Island and Philpott No. 4 developments, at estimated costs of $30,900,000 and $5,240,000, respectively, for construction and $134,500 and $29,600 annually for operation and maintenance, should be selected for early construction as the initial step.

The average annual benefits from these two developments will exceed the average annual charges by about 35 percent [3550] and over 90 percent of the flood losses to the two main flood-damage areas in the Roanoke River Basin will be eliminated. Buggs Island as an initial development will produce 278,000,000 kilowatt-hours of prime and 153,000,000 of secondary energy per year. Philpott No. 4 as an initial development will produce 22,400,000 kilowatt-hours of prime and 1,200,000 of secondary energy per year. If power is charged with its proportionate part of the cost, the average cost of production of energy is 3.04 mills per kilowatt-hour at Buggs Island and 4.05 mills at Philpott No. 4. The regulating effect of Philpott in a system with Buggs Island will increase the annual output at Buggs Island by 800,000 kilowatt-hours. Construction of other units of the comprehensive plan should be undertaken when warranted by the need for additional generating facilities in the area. In order to insure the best service to the area it is advisable that provision be made to construct, operate, and maintain transmission lines, substations, and facilities, and structures appurtenant thereto, as may be found necessary for the transmission, interchange, and sale of energy. To safeguard the interests of navigation and flood control, the dams and power facilities should be constructed, operated, and maintained under the direction of the Secretary of War and the supervision of the Chief of Engineers; the power to be disposed of under contracts approved by the Federal Power Commission.

11. The Board recommends improvement of the Roanoke River and tributaries for flood control, navigation, the generation, transmission, and sale of hydroelectric power and for other beneficial uses by the construction of dams and hydroelectric power plants at Buggs Island, Gaston, Roanoke Rapids, Smith Mountain, Leesville, Taber, Melrose, Randolph, Philpott, Stuart, and Schoolfield, generally in accordance with the plans of the district engineer and with modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, at an estimated cost of $124,000,000 for construction and $657,800 annually for operation and maintenance, the initial step to consist of the construction of dams and hydroelectric power plants at Buggs Island and Philpott at an estimated cost of $36,140,000 for construction with $164,100 annually for operation and maintenance, and the other units of the plan to be constructed progressively at such rates as future developments may indicate desirable.

For the Board:

JOHN J. KINGMAN,
Brigadier General, United States Army,
Senior Member.

[3552] WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE,
Norfolk, Va., January 30, 1943.

Subject: Review Report on Roanoke River, Va. and N. C.

To: The Chief of Engineers, United States Army, War Department, Washington, D. C. (Through the Division Engineer, Middle Atlantic Division).

1. *Authority.*—This report on the Roanoke River, Va. and N. C., is submitted in accordance with the following act and resolutions of Congress:

* * * * *

2. *Scope of survey.*—This report presents a comprehensive plan of improvement to provide several reservoirs on the Roanoke River and its tributaries for the purpose of controlling floods, generating hydroelectric power, regulating low-water flows, and performing other beneficial functions incidental thereto.

3. *Arrangement of report.*—The report is arranged under the following general headings:

I. General features.
II. The flood problem.
III. Flood control.
IV. Comprehensive plan for multiple-purpose reservoir development.
V. Discussion.
VI. Conclusions.
VII. Recommendations.

[3590] IV. Comprehensive Plan for Multiple-Purpose Reservoir Development

* * * * *

[3598] 148. *Alternative plans.*—It was determined that 2 alternative systems of reservoirs were possible and that either one would be justified for the comprehensive development of the potential water power in the basin. These plans are herein referred to as the "preferred plan" and the "alternative plan." The locations of the reservoirs for both plans are shown

geographically on plate 24 and in profile on plates 3, 4, and 5.[1] The dam sites common to both schemes are at the same location. The dam sites with similar names are at the same locations as considered in the 1934 plan. The preferred plan would contain 11 reservoirs and the alternative plan 13 reservoirs. The essential [3599] differences between the 2 plans are indicated by the reservoir-full elevations of each project, as shown in the following tabulation.

TABLE 33.—*Alternative reservoir plans*

Reservoir	River	Reservoir-full elevations		Reservoir	River	Reservoir-full elevations	
		Preferred plan	Alternative plan			Preferred plan	Alternative plan
Roanoke Rapids	Roanoke	127	127	Taber	Roanoke	525	525
Gaston	do	200	200	Leesville	do	597	597
Buggs Island	do	317	277	Smith Mountain	do	780	780
Clarksville	do	(1)	320	Schoolfield	Dan	500	500
Randolph	do	380	420	Stuart	Smith	655	665
Melrose	do	436	463	Philpott	do	995	995
Seneca	do	(1)	486				

[1] Dams at these sites not included in preferred plan.

* * * * * *

151. *Provision for flood control.*—Certain flood-control features were embodied in both plans. In the preferred plan storage exclusively for flood control was reserved above the maximum power pool at the Buggs Island and Philpott sites. In the alternative plan similar storage was provided at Buggs Island, Clarksville, and Philpott sites. The designs of the dams at the Smith Mountain, Randolph, and School-

[1] Plate 4 is not printed.

field sites in each case included spillway features to compensate for the natural valley storage eliminated above the confluence of the Dan and upper Roanoke Rivers by the construction of the ultimate system of reservoirs. A discussion of the effects of natural valley storage modifications is given in section B of the appendix.[1]

152. In the preferred plan the storage reserved exclusively for flood control in the Buggs Island project was approximately equivalent to 1 inch of runoff over the tributary watershed. This storage, plus [3600] that which would be available from seasonally scheduled draw-down of the power pool, would provide effective flood control downstream. In the alternative plan, an equivalent amount of flood-control storage was considered as divided between the Buggs Island and Clarksville projects, without giving credit for draw-down of the power pool, as these projects were considered mainly as head developments for power.

153. In both plans a multiple-purpose reservoir at the Philpott site on the Smith River would be operated to practically eliminate the flood hazard along that stream.

154. Figure 3 on plate 20[1] shows the effect of the preferred plan of ultimate development on the accumulated average annual future flood losses in the Roanoke, Dan, and Smith River Valleys.

* * * * *

[1] Not printed.

Project	Buggs Island	Gaston	Roanoke Rapids		Smith Mountain	Leesville	Tabor
River	Roanoke	Roanoke	Roanoke		Roanoke	Roanoke	Roanoke
Number of reservoirs considered in system (stage of development)	1	2	3		4	5	6
			Dam	Canal			
Location of dam, miles above mouth or river	178.67	144.90	137.52	[4] 129.5	314.18	293.72	274.98
Drainage area, square miles	7,800	8,339	8,395		1,020	1,497	2,249
Type of dam	[5]	[5]	Concrete		Concrete	[5]	Concrete
Type of spillway	Gated	Gated	Gated		Ungated	Gated	Gated
Maximum height of dam, feet	149	108	79		244	95	54
Stream flow, cubic feet per second:							
Average flow (1912–40)	7,960	8,520	8,570		976	1,430	2,160
Maximum flow of record	270,000	267,000	261,000		70,000	96,000	120,000
Minimum flow of record	467	485	487		93	135	195
Design flood inflow	600,000	535,000	535,000		196,000	130,000	290,000
Design flood outflow	525,000	535,000	535,000		34,000	125,000	259,000
Reservoir elevations:							
Top of dam	332	212	147		814	610	534
Maximum (design flood)	325	205	142		808	599	535
Top of gates or spillway crest of ungated dam	317	209	127		780	597	525
Top of flood control storage reservation	317						
Maximum power pool	312	200	127	[6] 125	780	597	525
Minimum power pool	[7] 283.6	198	125	125	734	596	522
Storage capacity, acre-feet:							
Surcharge storage [8]	744,000	88,000	71,000		565,000	5,700	26,000
Minimum flood storage reservation	416,000	0	0	0	0	0	0
Usable power storage	[7] 1,400,000	39,000	7,100		520,000	2,800	5,500
Total storage [9]	2,706,000	432,000	50,700		825,000	76,900	34,000
Tailwater elevation:							
Maximum (design flood)	252	159	117	85	611	564	530
Maximum of record, natural	232	149	105	74	618	560	514
Maximum of record, controlled	216	139	96	62	601	547	512
Minimum	199	120		21	592	520	485
Average power operation [7]	202	125	85	29	597	531	488
Operating head, feet: [7]							
Gross static	110.0	75.0	42.0	96.0	183.0	66.0	37.0
Maximum, net	107.0	72.0	40.0	89.5	180.0	64.0	35.0
Average, net	97.0	71.0	39.0	89.5	159.3	63.5	33.5
Minimum, net	78.6	70.0	38.0	89.5	134.0	63.0	32.0
Regulated flow, cubic feet per second: [7]							
Maximum	111,000	114,000	114,000		10,500	34,000	98,000
Average during critical period, net	4,650	4,980	1,500	3,650	842	1,049	1,392
Average for power, net	7,040	7,470	1,650	5,860	878	1,286	1,935
Power plant:							
Installed capacity, kilowatt	85,500	54,000	8,400	50,400	33,000	16,000	10,000
System capacity [7]	85,500	139,500		198,300	231,300	247,300	257,300
System average annual output: [7]							
Prime energy, 1,000 kilowatt-hours	278,000	505,000	748,900		875,500	917,600	947,200
Secondary energy, 1,000 kilowatt-hours	153,000	255,500	368,300		348,900	358,400	369,800
Total average annual energy, 1,000 kilowatt-hours	431,000	760,500	1,117,200		1,224,400	1,276,000	1,317,000

See footnotes at end of table.

Project	Melrose [2]		Randolph	Philpott No. 4	Stuart	Schoolfield
River	Roanoke		Roanoke	Smith	Smith	Dan
Number of reservoirs considered in system (stage of development)	7		8	9 [3]	10	11
	Melrose	Whipping Creek				
Location of dam, miles above mouth of river	262.9	1.0	227.75	44.3	5.25	66.97
Drainage area, square miles	2,370	19	2,982	212	534	1,890
Type of dam	(4)	(5)	(6)	(6)	(6)	(6)
Type of spillway	Gated	Ungated	Ungated	Ungated	Ungated	Ungated
Maximum height of dam, feet	110	96	147	214	138	126
Stream flow, cubic feet per second:						
Average flow (1912–40)	2,280		2,870	252	635	2,080
Maximum flow of record	128,000		155,000	29,600	38,000	70,000
Minimum flow of record	200		252	40	100	160
Design flood inflow	320,000		440,000	150,000	150,000	300,000
Design flood outflow	300,000	7,400	212,000	31,000	100,000	277,000
Reservoir elevations:						
Top of dam	510	498	415	1,020	678	527
Maximum (design flood)	496	494	406	1,013	672	521
Top of gates or spillway crest of ungated dam	486	486	380	995	655	500
Top of flood-control storage reservation				995		
Maximum power pool	486	486	380	986	655	500
Minimum power pool	485	478.5	367	925	632	487
Storage capacity, acre-feet:						
Surcharge storage [8]	38,400		514,000	77,000	98,000	282,000
Minimum flood storage reservation	0		0	34,000	0	0
Usable power storage	3,100	8,400	150,000	133,500	85,000	100,000
Total storage [8]	78,600	42,200	305,000	240,000	163,000	248,000
Tailwater elevation:						
Maximum (design flood)	458		355	810	583	[10] 450
Maximum of record, natural	443	407	350	810	574	[10] 431
Maximum of record, controlled	443	407	343	793	562	[10] 431
Minimum			311	780	545	[10] 414
Average power operation [9]		375	319	790	547	[10] 417
Operating head, feet: [7]						
Gross static		111.0	61.0	196.0	108.0	83.0
Maximum, net		107.0	59.0	192.0	105.0	81.0
Average, net		104.0	53.2	164.6	94.7	75.2
Minimum, net		102.0	46.0	131.0	82.0	68.0
Regulated flow, cubic feet per second: [7]						
Maximum	126,000		87,000	880	25,000	70,000
Average during critical period, net		1,431	1,798	218	462	1,209
Average for power, net		2,034	2,574	227	571	1,836
Power plant:						
Installed capacity, kilowatts		34,500	24,000	9,000	9,600	24,000
System capacity [7]		291,800	315,800	324,800	333,800	357,800
System average annual output: [7]						
Prime energy, 1,000 kilowatt-hours	1,041,400		1,107,000	1,436,900	1,168,300	1,229,700
Secondary energy, 1,000 kilowatt-hours	409,200		434,900	432,300	438,409	465,500
Total average annual energy, 1,000 kilowatt-hours	1,450,600		1,541,900	1,869,200	1,606,700	1,695,200

[1] See pls. 31 and 32. (Not printed.)
[2] See pls. 37 and 38. (Not printed.)
[3] Selection of project at the Philpott No. 4 site is mainly for its flood-control value. It should have first priority of construction on the Smith River.
[4] Location of powerhouse at end of canal.
[5] Concrete and earth fill.
[6] Earth fill.
[7] At given stage of development.
[8] Includes surcharge storage utilized above spillway crest or top of gates during spillway design flood with reservoir full prior to such flood.
[9] To top of gates or to spillway crest of ungated dam.
[10] With existing dam removed.

TABLE 36.—*Economic data—preferred plan of comprehension development*

Project	Buggs Island	Gaston	Roanoke Rapids	Smith Mountain	Leesville	Taber	Melrose	Randolph	Philpott No. 4	Stuart	Schoolfield
Reservoir—full elevation	317	200	127	780	597	525	486	380	995	655	500
River	Roanoke	Roanoke	Roanoke	Roanoke	Roanoke	Roanoke	Roanoke	Roanoke	Smith	Smith	Dan
	Economics of projects at progressive stages of development										
Stage of development [1]	1	2	3	4	5	6	7	8	[2] 9	10	11
Number of reservoirs considered in system at given stage of development	1	2	3	4	5	6	7	8	9	10	11
Installed capacity, kilowatts	85,500	54,000	58,800	33,000	16,900	10,000	34,500	24,000	9,000	9,000	24,000
System capacity at given stage of development	85,500	139,500	198,300	231,300	247,300	257,300	291,800	315,800	324,800	333,800	357,800
Construction investment:											
Individual project [3]	$31,490,000	$12,640,000	$11,970,000	$12,500,000	$3,650,000	$3,480,000	$9,150,000	$8,630,000	$4,880,000	$3,710,000	$9,630,000
Project cost per installed kilowatt	330	234	204	372	228	348	265	360	223	408	401
Reservoir cost per acre-foot	10	18	81	13	34	74	46	22	17	20	33
Accumulated system totals	31,490,000	44,130,000	56,100,000	68,600,000	72,250,000	75,730,000	84,880,000	93,510,000	98,390,000	102,100,000	111,730,000
Per installed kilowatt	330	294	266	282	278	281	279	285	283	287	294
Annual charges:											
To power	1,310,700	601,200	571,200	573,800	173,500	162,200	525,700	403,000	95,600	171,400	446,000
To flood control	144,800	0	0	10,000	0	0	0	0	132,200	2,000	0
Totals to individual projects	1,455,500	601,200	571,200	583,800	173,500	162,200	425,700	403,000	227,800	173,400	446,000
Accumulated system totals	1,455,500	2,056,700	2,627,900	3,211,700	3,385,200	3,547,400	3,973,100	4,376,100	4,603,900	4,777,300	5,223,300
Annual benefits:											
From power at site [4]	1,758,900	1,393,600	1,533,900	433,100	234,100	175,700	566,400	363,000	115,500	153,800	357,400
From downstream hydro plants existing in 1942	0	0	0	0	0	0	0	0	21,000	7,000	4,000
From flood control	207,000	0	0	10,000	0	0	0	0	[5] 160,000	2,000	0
Individual project total at given stage of development	1,965,900	1,393,600	1,533,900	443,100	234,100	175,700	566,400	363,000	296,500	162,800	361,400
Individual project total in ultimate development	2,110,000	1,402,000	1,577,400	443,100	234,100	175,700	566,400	363,000	296,500	162,800	361,400
Accumulated system totals	1,965,900	3,356,600	4,838,200	5,443,000	5,677,100	5,852,800	6,419,200	6,806,400	7,133,100	7,315,100	7,692,400
System increment	1,965,900	1,390,700	1,481,600	604,800	234,100	175,700	566,400	387,200	326,700	182,000	377,300
Excess system annual benefits over charges	510,400	1,299,900	2,210,300	2,231,300	2,291,900	2,305,400	2,446,100	2,430,300	2,529,200	2,537,800	2,469,100
Economic ratios (annual charges to annual benefits):											
System totals	1 to 1.35	1 to 1.63	1 to 1.48	1 to 1.69	1 to 1.68	1 to 1.65	1 to 1.62	1 to 1.56	1 to 1.55	1 to 1.53	1 to 1.47
Individual project increments [6]	1 to 1.35	1 to 2.32	1 to 2.60	1 to 1.04	1 to 1.35	1 to 1.08	1 to 1.33	1 to 0.96	1 to 1.44	1 to 1.05	1 to 0.84
Cost of average annual energy in system, mills per kilowatt-hour: [7]											
Prime energy [7]	4.55	3.66	3.20	3.38	3.42	3.47	3.56	3.70	3.69	3.74	3.90
Secondary energy	.29	.26	.24	.26	.27	.27	.28	.28	.29	.29	.30
Total average annual energy	3.04	2.51	2.23	2.49	2.53	2.58	2.63	2.74	2.75	2.79	2.91

[1] Most economical order of construction based mainly on analyses of value of projects for power production.

[2] Selection of project at the Philpott No. 4 site is mainly for its flood-control value. It should have first priority of construction on the Smith River.

[3] Exclusive of transformers, switching stations, and transmission lines.

[4] At generator voltages.

[5] Includes $10,000 in average annual low-water-regulation benefits.

[6] Ratio of system incremental charges to system incremental benefits over previous stage of development.

[7] Prime energy bears all fixed charges to power and also its proportionate part of operating expense.

[3613] 159. *Recommended comprehensive plan of reservoir development.*—The comparison shown in table 38 shows that either the preferred or alternative ultimate plan would be justified. The installed capacities of the ultimate development in each case are the same. The required investment for the preferred plan is slightly lower. The excess of annual benefits over annual charges in the preferred ultimate plan is somewhat greater than in the alternative plan.

160. In the initial stage of development, the excess of annual benefits over annual charges and the economic ratio for the preferred plan are considerably greater than for the alternative scheme. The initial reservoir, at the Buggs Island site in the preferred plan, would provide flood control immediately after construction for the lower Roanoke River Valley, where the largest proportion of the flood damages occur, exclusive of the Smith River Basin. In the intermediate stages of development, with a comparable construction investment and installed capacity, the preferred plan would be superior because (1) the unit cost of prime energy would be less, (2) the economic ratio would be higher, (3) the flood-control benefits would be greater, and (4) the excess annual benefits over annual charges would be greater.

161. These advantages of the preferred plan are sufficient to warrant its selection as the recommended scheme for the orderly comprehensive development of the water resources of the Roanoke River Basin.

162. *Estimated cost of recommended ultimate plan.*—The following table presents a summary of

the estimated cost of the recommended ultimate plan of development.

[3614] TABLE 39.—*Estimated cost of recommended ultimate plan of development*

Project	Estimated first cost	Interest during construction	Total investment
Buggs Island [1]	$31,730,000	$1,380,000	$33,110,000
Gaston	12,280,000	360,000	12,640,000
Roanoke Rapids	11,630,000	340,000	11,970,000
Smith Mountain	11,960,000	540,000	12,500,000
Leesville	3,540,000	110,000	3,650,000
Taber	3,380,000	100,000	3,480,000
Melrose	8,890,000	260,000	9,150,000
Randolph	8,370,000	260,000	8,630,000
Philpott No. 4	4,670,000	210,000	4,880,000
Stuart	3,600,000	110,000	3,710,000
Schoolfield	9,350,000	280,000	9,630,000
Step-up transformers and plant switching stations [2]	7,250,000	130,000	7,380,000
Transmission lines and terminal substations [2]	7,290,000	110,000	7,400,000
TOTAL	123,940,000	4,190,000	128,130,000

[1] Includes 1 spare unit of 28,500 kilowatts as reserve capacity for entire system.

[2] These costs were not included in the economic analyses shown in tables 36 and 37 because they are common to both plans considered and the same costs would be required of equivalent steam stations with which the proposed hydro plants are compared economically.

163. For each project in the recommended system of reservoirs the specific location of the dam site, map of the reservoir area, reservoir area-capacity relationship and suggested lay-outs of the dam and powerhouse are shown on plates 28 to 41, inclusive.[1]

* * * * *

167. *Cost estimates.*—The cost estimates, presented in tables 36 and 37 and summarized in detail for the recommended plan in section G of the appendix,[1] were prepared from preliminary designs based on topographic maps of the dam sites and reservoir areas; subsurface explorations; field appraisals of the value of land and buildings in the reservoir areas; and field

[1] Not printed.

and office investigations of required relocations of highways, railroads, and utilities within the flow line of the reservoirs.

168. The designs of the dams, power plants, and appurtenant structures are preliminary, but were made in sufficient detail to provide reliable estimates of cost. The unit costs assumed in the estimates were selected to reflect prevalent contract prices of January 1, 1942, [3615] (Engineering News-Record Cost Index 268), where competitive bidding by a number of reliable contracting firms is assured. An item of 35 percent of the estimated construction cost and of the appraised value of the flowage damages was included to cover contingencies and supervision, legal, inspection, and engineering expenses.

169. *Annual charges.*—Annual charges for the dams and appurtenant structures, reservoirs, and powerhouses include the following:

(a) Interest at 3 percent of the estimated investment (first cost plus interest during construction).

(b) Amortization of the total estimated investment at an interest rate of 3 percent based on the sinking-fund method to return the investment within 42 years.

(c) Fixed annual operating and maintenance charges at 0.4 percent of the total investment, exclusive of relocation costs of highways, railroads, and other improvements within the reservoir areas.

(d) Annual operating charges on the powerhouse at $0.40 per kilowatt of installed generator capacity.

170. *Water-power value.*—The annual value of the potential water power available has been established,

for the purpose of this report, as the cost of an equivalent supply of power developed by a new steam plant of modern design located at a favorable site in or near the Roanoke River Basin to supply an interconnected power system. The capital investment per kilowatt of dependable steam capacity, exclusive of step-up transformer and substation equipment, was taken as $100. Annual charges, on a privately financed basis, were taken as follows:

	Percent
Fixed charges, in percent of capital investment:	
Return on investment	6.00
Depreciation and obsolescence	2.75
Taxes and insurance	1.50
Fixed operating and maintenance charges	1.50
Total fixed charges	11.75
Variable charges:	
Operating and maintenance expense, mills per kilowatt-hour	.35
Fuel cost (at $4 per ton, 1 pound=1 kilowatt-hour), mills per kilowatt-hour	2.00

These investment and operation costs for an equivalent steam plant establish the annual value of water power, at the generator in the powerhouse, at $11.75 per kilowatt-year of dependable capacity plus 2.35 mills per kilowatt-hour of generation. If 4,380 kilowatt-hours of prime energy are generated annually by each kilowatt of firm capacity, a value of 5.03 mills per kilowatt-hour for prime energy at generator voltage results— $\frac{\$11.75}{4{,}380}+2.35=5.03$ mills). The value of secondary energy was assumed as fuel saving only, which results in a value of 2.35 mills per kilowatt-hour for this class of energy, when it could effectively replace, temporarily, steam-generated energy in an interconnected system.

[3619] D. INITIAL DEVELOPMENTS OF COMPREHENSIVE PLAN

182. The ultimate comprehensive development of the water resources of the Roanoke River Basin would include 11 projects: 2 multiple-purpose reservoirs for flood control, water power, and low-water regulation; 9 other reservoirs on the Roanoke, Dan, and Smith Rivers for storage and head for power production, estimated to cost about $124,000,000. The construction of these projects should proceed over a number of years, as additional power facilities are required. The storage reservoirs would provide sufficient flow to extend navigation facilities from Palmyra to Weldon by the construction of 1 lock and dam.

183. The initial projects in the orderly development of water resources of this watershed would be the multiple-purpose reservoirs at the Buggs Island site on the Roanoke River and the Philpott site on the Smith River. These two projects, costing about $36,200,000, would provide hydroelectric power from a total initial installed capacity of 94,500 kilowatts; would practically eliminate the flood hazard in the Smith River watershed; and would materially reduce the flood damages in the lower part of the Roanoke River Valley in North Carolina.

184. *Buggs Island project.*—The dam for this reservoir would be located on the Roanoke River, 178.67 river miles upstream from the mouth and 20.3 miles downstream from Clarksville, Va. The reservoir would have a total storage capacity of 2,706,000 acre-feet. The dam would consist of 2,220 feet of concrete gravity structure in the river and left abutment

sections, 1,180 feet of rolled earth-fill section on the right abutment, and a total of 19,000 feet of low rolled earth-fill dikes on both banks. The maximum height of the dam would be 149 feet, and the spillway would consist of 15 taintor gates, each 40 feet wide by 30 feet high. The powerhouse would be situated on the right bank, with an initial installation of three 28,500-kilowatt generators, each connected to a 40,000-horsepower Francis-type turbine. The location and lay-out of the dam and powerhouse are shown on plate 28.[1] The reservoir area is shown on plate 29.[1] The reservoir, full to the top of the spillway gates, would inundate approximately 80,000 **[3620]** acres, of which 65 percent is wooded. Alterations would be required to 43 miles of primary and secondary highways, and to 3 miles of railroad. A detailed description of the dam site, reservoir area, and results of investigations made to determine the required investment are included in section A of the appendix.[1] A detailed estimate of cost is contained in section G of the appendix.[1]

185. *Water power.*—The reservoir would control 7,800 square miles of tributary drainage area. With a usable power storage of 1,400,000 acre-feet, the minimum stream flow would be increased from a past extreme low of 467 second-feet to an average flow of 4,650 second-feet for power production in a year comparable to the driest of record. The average annual power output at generator voltage would be approximately 431,000,000 kilowatt-hours (58 percent capacity factor) at a cost of about 3.04 mills per

[1] Not printed.

kilowatt-hour. The initial installation of 85,500 kilowatts could generate approximately 278,000,000 kilowatt-hours of prime energy at an annual capacity factor of 37 percent in the minimum year. The balance of the average annual energy, 153,000,000 kilowatt-hours, would be utilized for secondary power and would not be available in a critically dry year like that of 1932. Space has been provided in the suggested lay-out of the dam and power house for additional generating units which would allow for generating power at a lower load factor than in the initial development, if a need therefore became apparent.

186. Analyses were made to determine the most economical elevation of the maximum power pool. An elevation of 312 was selected as the most favorable, considering the value of the usable power storage to future downstream plants and the limitation of the tail-water elevation of the Randolph project, the next upstream plant in the comprehensive development. Curves of duration of power flow, storage-draft relationships, area and capacity versus reservoir surface elevation, power output, dam and reservoir investment versus height, evaporation, cost of power plants, summaries of economic analyses, and other data are shown for the initial development on plate 42.[1] Power output that would have been available from the runoff in past years and suggested method of operation of the reservoir are shown graphically on plate 43.[1]

[1] Not printed.

187. *Flood control.*—Benefits from various amounts of storage reserved exclusively for flood control, above the maximum power pool, were analyzed. The plan found most feasible includes the following:

(a) A storage of 416,000 acre-feet, equivalent to 1 inch of runoff over the tributary drainage area, reserved exclusively for flood control above the maximum power pool.

(b) Additional storage made available for flood control by seasonally scheduled draw-down of the power pool.

(c) A flood forecasting system, which would furnish additional flood storage by increasing the discharge from the power pool through the turbines and gates immediately upon the prediction of a flood. The scheduled plan of draw-down of the power pool would insure the production of firm power output, maximize the generation of off-peak and week-end power in the average year by avoiding waste, and would make additional storage available for flood control in all months except May of each year, as shown graphically in figures 1 to 4 on plate 43.[1] This plan of operation envisages the use of storage above the maximum power pool and the use of the spillway gates to permit the desired discharge at any time. Competent flood forecasting at the beginning of any flood would allow the maximum conservation of available storage and the use of additional storage where possible by discharging water through the gates and turbines in advance of the flood

[1] Not printed.

peak at the rate of the anticipated controlled flood discharge. Although the damages from major floods would not be entirely eliminated by this plan of operation, they would be materially reduced.

188. It is estimated that the Buggs Island project, operated as proposed, would eliminate over 90 percent of the average annual flood losses in the lower part of the Roanoke River Valley in North Carolina.

[3622] 191. *Economic data.*—The following table summarizes the economic aspects of the Buggs Island multipurpose project.

TABLE 46.—*Economic aspects of the Buggs Island multipurpose project*

Estimated investment:	
Dam and appurtenant works	$11,030,000
Estimated flowage cost:	
Reservoir clearing, land, and buildings	7,710,000
Alterations to railroads and highways	6,530,000
Powerhouse and equipment	4,860,000
Stepup transformers and switchyard	800,000
Total estimated first cost	30,930,000
Interest during construction	1,370,000
Total estimated investment	32,300,000
Annual charges [1]	1,455,500
Annual benefits:	
From power at site [2]	1,758,000
From flood control	207,000
Total annual benefits	1,965,900
Economic ratio (annual charges to annual benefits)	1 to 1.35

[1] Annual charges to total investment exclusive of transformers and switchyard.
[2] Power value at generator voltage.

The value of the stream flow regulation provided by the Buggs Island project to the Gaston and Roanoke Rapids projects, as shown for stage 3 in table 36, is not reflected in the above economic ratio. The eco-

nomic ratio for these three projects in combination is 1 to 1.84.

192. *Utilization of power.*—In December 1941, a memorandum report on the need for the power which could be developed at the Buggs Island multipurpose project was prepared by the Federal Power Commission. This report is included in section D of the appendix.[1]

193. In that report, the Commission indicates that the Buggs Island project is excellently located with respect to existing transmission facilities; and that, probably, no further transmission line construction, other than that required to make short connections to [3623] these facilities, would be necessary immediately for transmission of the power from the project. (See pl. 26.)[1] This project would, at times, serve portions of power-supply area 10, but according to the report, it was assumed that the two adjoining power-supply areas 18 and 21 would be the market area for the bulk of the power generated at the project.

194. Table 31 indicates the additional capacity required in areas 10, 18, and 21 up to 1947. The Commission believes that an initial installation of not more than 80,000 kilowatts would be suitable at the Buggs Island project for use in the war emergency in conjunction with existing capacity of the contiguous electric utility companies. The initial capacity of 85,500 kilowatts recommended in this report is in essential agreement with the added consideration of maintaining a possible output of 80,000 kilowatts at

[1] Not printed.

the lower operating heads. An installation of 85,500 kilowatts would permit generation of power in the driest and average years at annual capacity factors of 37 and 58 percent, respectively. Space is provided in the lay-out of the powerhouse for additional generating units as the need therefor is determined. The excess of value over cost will increase materially as additional capacity is installed at the project for operation at lower capacity factors.

195. The completion and operation of the Buggs Island project would, by replacement, aid materially in solving the capacity problems on the systems of the existing utilities which serve in areas 18 and 21, as well as in area 10 to the west. Advantages to the existing utility systems in each area would be manifest in savings in capacity investment, both firm and reserve, and in economies from reallocation of steam-generated energy in the system loads. Operating economies would be enhanced by daily and seasonal peak diversity between systems and also by dependable peak diversity between existing run-of-river and regulated hydro plants. These advantages provide incentives to fully develop the opportunities of coordination and interchange of power.

196. *Philpott project.*—The Philpott Dam site is located on the Smith River, 44.3 miles above the mouth of the stream. The project consists of an earth dam with a maximum height of 214 feet; a powerhouse immediately downstream therefrom; a gated tunnel for flood operations, and an ungated concrete spillway, constructed in a saddle at the left abutment, upstream from the dam. The location and lay-out of

this project are shown on plate 30.[1] A detailed description of the development is presented in Section A of the appendix.[1]

197. *Water-power and low-water regulation.*—A reservoir at the Philpott site is justified as a flood-storage reservoir, as shown in table 26. However, if a multipurpose reservoir were constructed at this site, with impoundment of water for power production and low-water regulation in addition to the reservation made for the primary function of flood control, it would insure that the economic potentialities, as well as all other values of the site, would be fully utilized. Curves showing storage requirements, duration of flow, storage-draft relationships, allowable draw-down, and maximum allowable reservoir draw-down for water use greater than that required for prime energy generation are presented on plate 44.[1]

[3624] 198. The benefits from low-water regulation have been previously discussed in paragraph 116. These benefits would be the same for the multipurpose reservoir as indicated for the dual-purpose reservoir. If the population and industrial expansion of the Smith River Valley continue to increase as in the last decade, the annual benefits from low-water regulations may be many times the estimated average value of $10,000, especially with the added minimum flows provided by the power operation.

199. *Flood control.*—Thirty-four thousand acre-feet of storage below the spillway crest would be provided in the Philpott Reservoir for flood control. This amount is equivalent to 3 inches of storage over the

[1] Not printed.

controlled tributary watershed. This reservation, plus the surcharge storage which will be made available above the crest of the 100-foot ungated spillway, will provide a considerable reduction in flood stages below the site. The reservoir will provide flood protection by eliminating about 97 percent of the total average annual flood losses along the entire Smith River.

200. *Operation of reservoir.*—The operation of the Philpott Reservoir during flood stages contemplates the use of the spillway as a flood-control device to impound water above the spillway crest in addition to that impounded below the spillway crest. The tunnel-outlet works would be used only to draw the water rapidly from the flood-control storage reservation after the downstream flood stages had receded to below no-damage stage.

201. Flood forecasting is not a practical possibility in the Smith River watershed because of the flashy nature of the run-off in frequent storms with intense rainfall. The ungated spillway contemplated for the proposed Philpot Dam would provide an effective flood-control device. Even if the reservoir were full to the spillway crest prior to the beginning of the flood, the surcharge storage above the spillway crest would retard the runoff from the controlled watershed sufficiently to allow runoff from the uncontrolled drainage area to peak prior to the reduced peak from the controlled drainage area, as illustrated in figures 4 and 5 on both plates 9 and 10.[1] Further details relative to the operation of this reservoir are included in section B of the appendix.[1]

[1] Not printed.

202. *Effect on past and future floods.*—The reduction of flood stages by the Philpott multipurpose reservoir during floods similar to those that recently occurred and in the maximum probable flood would be comparable to the reductions shown for the dual-purpose reservoir, as indicated in table 27. Figure 3 of plate 20 [1] shows graphically the effect of the Philpott Reservoir on the accumulated average annual future flood losses in the Smith River Valley.

203. *Economic data.*—The following table summarizes the economic aspects of the Philpott multipurpose project:

TABLE 47.—*Economic aspects of the Philpott multipurpose project*

Estimated investment:	
Dam and appurtenant works	$3,675,000
Estimated flowage cost:	
Reservoir clearing, land, and building	257,000
Alterations to highways	81,000
Powerhouse and equipment	347,000
Power tunnel and penstocks	310,000
[3625] Stepup transformers and switchyard	235,000
Transmission line and terminal switching station	335,000
Total estimated first cost	5,240,000
Interest during construction	220,000
Total estimated investment	5,460,000
Annual charges [1]	227,800
Annual benefits:	
From power at site	115,500
From existing downstream hydro plants	21,000
From flood control	150,000
From low-water regulation	10,000
Total annual benefits	296,500
Economic ratio (annual charges to annual benefits)	1 to 1.30

[1] Based on total investment exclusive of transformers, switchyard, and transmission lines.

The above economic ratio is based on the project as an initial develpment. The benefit from its regulation

[1] Not printed.

to downstream future power reservoirs would increase its economic ratio in the ultimate system to 1 to 1.44.

204. *Utilization of power.*—Investigations indicated that the power output from the Philpott multipurpose reservoir could be utilized economically in the immediate future in the interconnected utility systems serving power-supply area 10. Estimates made by the Federal Power Commission indicate that a considerable shortage in capacity of electric-power generating facilities will occur in this area due to the increasing demands of the war program for industrial power. After the war the potential power could be utilized to furnish firm energy and reserve requirements in a local cooperative enterprise serving the municipal systems at Danville and Martinsville, and to industrial plants at Bassett, Fieldale, and other localities in the Smith River Basin. The normal growth of electrical requirements in power-supply area 10 is expending at a rate which could absorb the potential power available from this project in less than 1 year. Consequently, as an alternative to its utilization in the proposed local cooperative after the war, this potential power could be absorbed economically in the peak-load service of the existing interconnected utility systems now serving the area, or as replacement to one or more of the obsolete steam-generating units now performing this function.

* * * * *

[3626] 213. A recommended plan for the orderly development of the basin was established. This plan consists of 11 reservoirs which would cost [3627] approximately $124,000,000. The ultimate development

would have an installed electrical-generating capacity of about 360,000 kilowatts which could generate about 1,700 million kilowatt-hours of energy in the average year, of which about 1,300 million kilowatt-hours could be generated in a year comparable to the driest of record. The annual benefits from the ultimate plan would exceed the annual charges by 47 percent. The storage reservoirs contemplated in the recommended plan would provide sufficient flow to extend navigation facilities from the present head of navigation at Palmyra, N. C., to Weldon, N. C., by the construction of one lock and dam on the Roanoke River at mile 114, should such facilities be found to be warranted in the future.

214. Provision was made in the development for controlling floods in the Smith River Valley and in the lower Roanoke River Valley. After the construction of all the reservoirs in the ultimate plan, 84 percent of the average annual flood damage to existing property on the flood plain along the Roanoke, Dan, and Smith Rivers will be eliminated, as shown graphically in figure 3 on plate 20.[1] The comprehensive plan will not provide flood protection for areas (1) along the Roanoke River at and upstream from Roanoke, Va., (2) for areas along the Dan River, or (3) for areas along other smaller tributaries, because investigations indicated the cost of flood protection was not economically justified at these localities.

215. *Initial projects.*—An orderly plan of development was established by determining the priority of

[1] Not printed.

construction for the several projects in the comprehensive system. The first two projects to be constructed would be the Buggs Island project on the Roanoke River and the Philpott No. 4 project on the Smith River. These two multipurpose projects would cost about $30,900,000 and $5,240,000, respectively, and would generate a total of 455 million kilowatt-hours in the average year, of which 300 million kilowatt-hours would be prime energy from an installed generating capacity of 94,500 kilowatts. The average annual benefits from these two projects would exceed the average annual charges by 35 percent.

216. Based on reports of the Federal Power Commission, the power generated in these two plants could be utilized to meet the rapidly growing demands of the contiguous power market areas. If these projects were constructed by the end of 1944 or 1945 they could be readily utilized to meet a portion of the 700,000 additional kilowatts in capacity which is expected to be required by 1947 in power-supply areas 10, 18, and 21 to meet probable demands of the war effort. Transmission facilities would not be a major item of cost. The Buggs Island power plant would require little, if any, transmission lines to connect it to existing major transmission networks. Only a short transmission line would be required from the Philpott plant to connect it to an existing high-tension transmission line.

217. The Buggs Island and Philpott projects would provide practically all the flood-control features included in the final plan of development. A flood-control storage reservation of 34,000 acre-feet would be

provided in the Philpott Reservoir and 416,000 acre-feet in the Buggs Island Reservoir. These storage reservations, plus the additional surcharge storage provided above the spillway in the Philpott Reservoir and the seasonally scheduled draw-down storage which is proposed to be made available in the power pool of the Buggs Island Reservoir, will eliminate over 90 percent of the flood loses to the two main flood-damage areas in the Roanoke River Basin..

218. *Unevaluated benefits.*—In addition to the evaluated benefits attributed to the comprehensive plan of reservoir development, certain intangible benefits which are not susceptible to direct monetary evaluation will be realized. These unevaluated benefits would be as follows:

(a) Reduction of the probability of loss of life in the future during floods in the Roanoke River Basin.

(b) Reduction of damages to normal future property development.

(c) Reduction of soil erosion downstream from the dams.

(d) Conservation values as wildlife refuge areas.

(e) Recreational values.

(f) Possible values of some of the reservoirs for future domestic water supply and for stream pollution abatement.

(g) Value of the proposed reservoirs as a factor which should aid in the further industrial development of the southern part of Virginia and the northern part of North Carolina.

(h) Value of the regulation of stream flow, resulting from the storage reservoirs, in the future extension of the navigation project to Weldon, N. C.

(i) The value of the power developments in time of war or during other power emergencies.

VII. Recommendation

[3629] 220. The district engineer recommends the adoption of the comprehensive plan proposed in this report for the orderly development of the water resources of the Roanoke River Basin. The estimated cost of this plan is $124,000,000, with estimated annual charges of $657,800 for operation and maintenance. In view of the imminent requirements of additional electrical generating capacity for the war effort in the power-market areas contiguous to the Roanoke River Basin, the district engineer further recommends that construction, maintenance, and operation of the Buggs Island and Philpott multipurpose reservoir projects for control of floods, generation of hydroelectric power, low-water regulation, and other beneficial purposes be authorized in the near future at such time as it is determined that the present shortage of critical materials has been alleviated. The Buggs Island project, consisting of a dam, reservoir, hydroelectric power plant, and appurtenant structures, with the dam located on the Roanoke River in Virginia, 20.3 miles downstream from Clarksville, Va., is estimated to cost $30,900,000 with annual charges of $134,500 for operation and maintenance. The Philpott project consisting of a dam, reservoir, hydroelectric power plant, and appurtenant structures, with the dam located on the

Smith River, in Virginia, 3.4 miles upstream from Philpott, Va., is estimated to cost $5,240,000, with annual charges of $29,600 for operation and maintenance. If the Buggs Island and/or Philpott projects are adopted for construction during the present war, 10 percent in addition to the above estimated costs should be provided to take care of probable increased costs. Although under normal conditions each of these projects would be constructed in 3 years, they may each be readily adapted to a maximum 2-year construction period.

W. W. LAPSLEY,
Lieutenant Colonel, Corps of Engineers,
District Engineer.

[First endorsement]

OFFICE, DIVISION ENGINEER,
MIDDLE ATLANTIC DIVISION,
Baltimore, Md., June 22, 1943.

To: The Chief of Engineers, United States Army, Washington, D. C.

1. The conclusions and recommendations of the district engineer are based on a careful investigation and survey. The designs and estimates of cost appear to be conservative. The calculated benefits are considered to be reasonable. The justification for early accomplishment of the initial development, embracing multiple-purpose dams at Buggs Island and Philpott, is materially increased by the substantial security that would be afforded to areas along the Roanoke River in North Carolina and along the Smith River,

and by the indicated ready market in the region for additional power.

2. The prime regulated flow provided by the Buggs Island plant will permit sizable additional benefits to be obtained by construction of downstream plants at the Gaston and Roanoke Rapids sites. These two plants, with a total installed capacity of 112,800 kilowatts, would cost approximately $25,000,000. Construction of the plants would be warranted as soon as the power requirements of the region become great enough to absorb the additional capacity.

3. The division engineer concurs with the district engineer in the conclusion that improvements to provide protection against floods to areas along the Roanoke River at and upstream from the city of Roanoke, the Dan River, and smaller tributaries other than the Smith River, are not justified at this time.

4. The division engineer recommends the adoption of a project to provide for comprehensive and orderly development of the water resources of Roanoke River, Va. and N. C., substantially as proposed by the district engineer, at an estimated total cost to the United States of $124,000,000. He further recommends that the initial development, involving construction of multiplepurpose reservoirs at Buggs Island and Philpott at estimated costs of $30,900,000 and $5,240,000, respectively, be authorized at this time for immediate postwar accomplishment.

* * * * * *

C. KITTRELL,
Colonel, Corps of Engineers,
Division Engineer.

Position of Commission's Staff

* * * * *

[24] Mr. Gatchell. Mr. Examiner, the application which is the subject of the hearing today was presented to the Commission under Section 4 (e) of the Federal Power Act. By Section 7 (b) of that Act, the Commission is required to determine whether in its judgment the proposed project should be developed by the United States and not by an applicant under the statute.

Under Section 10 (a) of the Act, if the Commission decides that a license may be granted, the Commission then examines the application to determine whether the project proposed is best adapted to a comprehensive plan for the development of the water resources for the several purposes stated in that sub-section.

It is the view of the staff of the Commission, first, that the application was properly filed under the Federal Power Act because there has been no determination by Congress, by the Chief of Engineers, by the Secretary of the Army, or by the Federal Power Commission that the United States alone should develop the Roanoke Rapids site.

It is the further position of the Commission that the application, as it is presented here, will call for the presentation of factual evidence bearing upon whether the Commission should at this time find

that in its judgment the project should be built by the United States; a purely factual [25] question.

It is the view of the staff that the Commission should find that development by the United States under the circumstances presented is not advisable, is not in the public interest, and that the application, as supplemented, should be granted.

It is the further view of the staff that the application as supplemented meets the test prescribed in Section 10 (a) of the Act calling for a plan of development which is best adapted to a comprehensive plan for the entire region.

We propose, at the appropriate time, to present evidence of the staff's analysis of the application, as supplemented, but until we know what evidence the applicant proposes to put in and has put in, and we have had an opportunity to analyze that evidence, until we have had an opportunity to analyze the evidence put in by any of the interveners, or the Secretary of the Interior, we are unable to say just what evidence the staff will offer.

* * * * *

[26] CHIEF PRESIDING EXAMINER. May I inquire, Mr. Gatchell, whether it is your contention that the action of the Congress on the report or recommendation of the Army Engineers, and whatever approval was given by this Commission to the comprehensive plan of the Army Engineers, was only as to the physical construction and operation of the plants and did not undertake to say by whom they should be built?

Mr. GATCHELL. That is the position of the staff, your Honor, somewhat more succinctly stated than I could state it. It is our feeling that the Commission did not, in its letter, that is incorporated as a part of House Document 650, the Commission did not at that time say this project should be built by the United States.

CHIEF PRESIDING EXAMINER. Your contention is that it simply approved that method of developing the water power resources?

Mr. GATCHELL. It approved a general plan of development of the Roanoke River Basin and in the Act of 1944, Section 10 approves first, the general plan of development, the comprehensive [27] plan of development outlined in House Document 650. That Act further expressly authorizes for construction by the United States of the Buggs Island and Philpott projects to be constructed in the Roanoke River Basin. Those two projects are the only two as to which there has been a decision by Congress or by anyone else, of which we know, that the United States should undertake their construction and that those projects must be built by the United States. Of course, as Your Honor knows, the Buggs Island project is now in process of construction.

It is the view of the staff further, that even if the letter of the Federal Power Commission be construed as a recommendation pursuant to Section 7 (b) of the Federal Power Act—which we do not think it is—if that be construed as a recommendation to Congress that the United States should build the Roanoke Rapids project; as well as the Buggs Island

and Philpott projects, that more than two years have elapsed since that letter and that under the next to the last proviso in Section 4 (e) of the Federal Power Act the Commission is free to act upon this or any other application for a project in the Roanoke River Basin, outside of the two that have been expressly named by Congress, namely, Buggs Island and Philpott.

It is further the view of the staff that in deciding upon this question the Commission should consider the several elements which relate to the public interest. We propose to see that [28] all of the facts available to the staff are presented to the Commission so that first the Examiner and then the Commission may make the decision upon that very important factual point.

It is our view that the Federal Power Act, from its very inception and passage in 1920, to the present day, affords a means of development of the water resources of the nation by non-Federal interests in a manner which will fully protect all of the public benefits and interests which should be protected and that Congress in that statute has laid down all the requirements which, in the judgment of Congress, are necessary to protect the public interests.

That being so, the statute makes a decision itself in Section 7 (a) where there are conflicting applications between public and private applicants that the public applicant should have the preference if its plans are equally well-adapted.

Congress lays down the further safeguard in Section 7 (b) that even if no public applicant, either a

state or municipal agency, applies for a project license at a site covered by an application filed by a privately owned company, that even in the latter situation the Commission makes the examination to determine if, in its judgment, the circumstances of the particular case warrant construction or require construction by the United States.

CHIEF PRESIDING EXAMINER. Do you have a view to express as to whether or not the plans of the applicant fit or are well [29] or best adapted to the comprehensive plan presented by the Army Engineers?

Mr. GATCHELL. As I stated previously, your Honor, it is the view of the staff that the plans as now presented and which are the subject of this hearing, are best adapted in conformity with Section 10 (a) of the Federal Power Act to a comprehensive plan of development of these water resources.

CHIEF PRESIDING EXAMINER. You say "a comprehensive plan." Are you now speaking of the plan presented by the Army Engineers?

Mr. GATCHELL. I am not, because that plan has been modified.

CHIEF PRESIDING EXAMINER. Are you speaking of it as modified?

Mr. GATCHELL. I am; yes, sir.

CHIEF PRESIDING EXAMINER. That is what I wanted to get. It is the view of the staff, then, that the plans of the applicant fit into the Army Engineers' comprehensive plan, as that plan has been modified?

Mr. GATCHELL. Yes, sir. I misspoke myself. I said we regard the plan of the Army Engineers as

modified—I was referring to the plan set out in House Document 650, as it has been subsequently modified.

CHIEF PRESIDING EXAMINER. As it was modified by the Congress?

Mr. GATCHELL. No, as it was modified by the Army Engineers.

[30] I do not believe the plans as set out in House Document 650 were final plans in any respect. They were always subject to and have been modified in many other cases, by subsequent investigations. They are made in a rather general way. When detailed investigations are made, it is frequently necessary, as in this case, to modify in minor details the particular plan of development at a particular site.

Our position is, and Mr. Costello will present the letter in due course, that as modified by the pending application the Army Engineers have now approved a plan which calls for the most comprehensive development of the Roanoke River at Roanoke Rapids and that the plan proposed by this applicant is in conformity with that comprehensive development.

* * * * *

[555] Mr. WHITEHEAD. Mr. Examiner, since the recess yesterday [556] afternoon I have carefully reviewed this record as best I could, dealing with the question of the order of presentation of evidence. I have given particular attention to the position of staff counsel, as I find it recorded at pages 24 and 25 of the transcript.

I gather from the position of counsel for the Commission there taken, that his position is at least sub-

stantially in accord with that of the applicant and that it is the considered opinion of staff counsel that the application, as amended, meets all of the requirements of the Federal Power Act; that this project should not be undertaken by the United States Government and that the application, as amended, should be granted.

If I am correct in that conclusion as to the position of staff counsel, and I feel that I am from the written word, then it seems to me the evidence offered by staff counsel must, of necessity, support, corroborate, and confirm that of the applicant.

If that conclusion then is true, it would seem that staff counsel's evidence should be presented following that of the applicant, for otherwise we would be confronted with the proposition that we would have no opportunity to rebut the evidence of staff counsel, which, in effect, though perhaps not formally as a part of the record of proceeding, will constitute a part of the evidence in behalf of the applicant.

Therefore, Mr. Examiner, most respectfully and earnestly, [557] we ask that before we go forward with our evidence the evidence on behalf of the staff counsel be presented.

* * * * *

Mr. GATCHELL. I think Mr. Whitehead is entirely correct, your Honor, in saying that the position of staff counsel is that this project, as applied for in the amended application, is one which, in the opinion of the staff, is best adapted to the comprehensive plan and that the license should be granted. And he is further correct in saying that it is the view of the

staff that the project should not be constructed by the United States.

However, I think he is—shall I put it, not quite stating our position as saying that we are intending to produce evidence or submit evidence which will be in support of the applicant; we are not here to support any applicant. We are not here to support any intervener. We are here to represent the United States and the public and to give the views of the technical employees of the Commission staff on the evidence that is presented with respect to this application.

I would think we would be derelict in our duty if the staff did not examine any applications that were presented and prior to a hearing form such conclusions as the evidence to that extent would justify in the opinion of those experts on the staff who have studied it.

We have done that in this case, as in every other case in [558] which I have participated. We have also stated the views of the staff, so that there might be no misapprehension as to what those views were at the time the hearing opened. We have, of course, seen nothing to justify a change in those views, because the applicant is the only one who has presented any evidence.

The plans of the applicant were made known to the staff at the time the application was filed in October, and as amended in April.

As a matter of fact, we suggested to the company that the application be amended, because it seemed

to us that the original proposal was not such as would provide for the best use of the water resources.

I can understand the desire of the interveners to have all of the evidence which would deal with the question presented before they present any evidence at all, but in that desire he is failing to take into account the function which we feel should be, and as far as we can do so, will be served by the staff, namely, to act merely as the technical advisers of the Federal Power Commission.

We are not an advocate in any sense of the word. We think the REA Cooperatives are entitled, and as far as I am concerned, they shall get the fullest opportunity to present any evidence which may bear upon this question.

We do not know what evidence they may have which would cause [559] us to change the views which we have and if the evidence presented by the REA Cooperatives is of such a nature that in our opinion or view it should be changed, I propose, for one, to see that those views are changed. But I cannot do that until their evidence has been presented.

CHIEF PRESIDING EXAMINER. May I inquire as to this:

You have certain evidence to present; you do intend to offer evidence?

Mr. GATCHELL. We have three witnesses who have studied this problem and are thoroughly informed upon it. We have their evidence assembled so that unless there is something else as to which we had not taken account of, we feel that their evidence could be presented, yes, sir.

CHIEF PRESIDING EXAMINER. It is true, I assume, that the evidence you will offer will in fact support the views and contentions that you have expressed?

Mr. GATCHELL. It will support the views which we have expressed, yes, sir. We do not do so on quite the same ground as the applicant. We have a slightly different approach than the applicant, but the evidence will support the views that I have expressed.

CHIEF PRESIDING EXAMINER. I am aware of the difference, but as you say it will, as a matter of fact, support the views you have expressed?

Mr. GATCHELL. Yes, sir.

[560] CHIEF PRESIDING EXAMINER. And those views do favor the granting of the application to the applicant in this case, is that right?

Mr. GATCHELL. No question about it, yes, sir.

CHIEF PRESIDING EXAMINER. Then, as a matter of law, and of fair hearing, I must rule in favor of the contention made by the REA Association of Virginia. Let me explain it this way:

I am aware of the many reasons that exist why the staff is always representing or supposed to represent the public interest—and as a matter of fact they do represent it—I am aware of the views that make it desirable that they shall hear everything, and then come in with an expression of their views, and that is the way that we usually arrange, in our hearings, the sequence for the offering of evidence.

But here is a case in which the staff does have a conviction, they have evidence ready to present in support of their contentions, and therefore, in support of the application. The people actually opposing

the application—and I speak of matters of fact, and not of theory now—the parties and participants opposing it are the Virginia REA Association and the Secretary of the Interior. All others here support the application as a matter of fact.

Now, with the advocates of the granting of the license, those supporting the granting of the license being all others in the [561] hearing, except the REA Association of Virginia and the Secretary of the Interior, as a matter of law I could not have them precede staff counsel in this matter. That is the very sincere conviction of the Examiner. Those opposing the application are entitled to see the entire case in chief in support of the application before they may be called upon to put on their case in chief in opposition, if they demand that right.

Mr. GATCHELL. * * * Does that mean we are not to be permitted to present evidence touching upon those matters that are made the subject of testimony by the Secretary of the Interior and the REA Cooperatives?

CHIEF PRESIDING EXAMINER. The advocates of the granting of the license have the burden of proof. They may offer testimony in rebuttal. Not only the applicant, but the Appalachian Electric Power Company, the Carolina Power and Light Company and staff counsel, all of whom are advocating the granting of the license, may offer testimony in rebuttal of that which will be offered by the opponents of the granting of the license.

* * * * *

[562] Now, if staff counsel had come in here and said, "We are neutral, we neither support the application, nor oppose it; we are here to listen and to supply any deficiency in the record for the public interest;" that is not true in this case here. The staff very frankly has reached the conclusion that this license ought to be granted to the applicant and their [563] evidence is in support of that proposition.

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Exhibit 8

[3649] DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, 27 April 1949.

Honorable NELSON LEE SMITH,
Chairman, Federal Power Commission,
Washington, D. C.

DEAR MR. SMITH: On 29 October 1948, the Commission transmitted to this office the application of Virginia Electric and Power Company for license for a water-power project (No. 2009) to be located in the reach of Roanoke River known as Roanoke Rapids in Halifax and Northampton Counties, North Carolina. By your letter of 11 April 1949, the amended application of the Virginia Electric and Power Company, was submitted to this office.

The Corps of Engineers have made studies of the development of the water resources of the Roanoke River Basin in reviewing these applications. These studies indicate that the Power Company's plan proposed in the amended application is satisfactory for development of the water resources of this reach of the Roanoke River, subject to further consideration of the factors outlined in the following paragraphs.

The applicant's plan contemplates a maximum power pool at elevation 132 as compared to one at elevation 127 in the Corps of Engineers' plan recommended in House Document No. 650, Seventy-eighth Congress, second session, and approved by Congress

in the Flood Control Act of 1944. A pool at elevation 132 would overlap by 5 feet the tailwater of the proposed upstream Gaston project thus seriously impairing its economic advantage.

Studies indicate that surges at Weldon will be considerable, amounting to as much as 11 feet in one day. Since the applicant's plant is proposed as a peak load plant, discharges may be expected to increase rapidly from, say, 1,000 c. f. s. to 17,500 c. f. s. It is expected that the Secretary of the Army, under condition (d) below, will impose regulations somewhat as follows. When a power load is imposed on the plant the normal operation shall be based on a uniform increase of water use at the rate of approximately 180 c. f. s. per minute which is equivalent to about 16,500 c. f. s. over a period of 90 minutes. In an emergency the capacity of one of the larger units requiring a release of about 5,000 c. f. s. may be put on the line at the speed of governor action. After a period of 30 minutes, remaining units may be brought into operation at the rate specified above, 180 c. f. s. per minute. If actual operating experience warrants changes of the foregoing requirements, the Secretary of the Army may make modifications to suit the operating conditions encountered.

[3650] In order to prevent any adverse effects on the flood control and other benefits of Buggs Island Reservoir, it may be necessary to impose restrictions on the operation of the proposed Roanoke Rapids project as provided under condition (i) below. It is anticipated that the flood control benefits of Buggs Island Reservoir will not be diminished by the opera-

tion of the proposed Roanoke Rapids Reservoir if the latter is operated to discharge flood inflow from the Buggs Island project as long as possible and the reservoir stage allowed to rise freely thereafter. In a flood of maximum size, a discharge of 770,000 c. f. s. from Buggs Island Reservoir would be required. On the other hand, during dry periods the discharge from Buggs Island Reservoir may vary from 500 c. f. s. to 16,200 c. f. s. daily and from an average 3,000 c. f. s. to 6,000 c. f. s. seasonally.

With the benefit of Buggs Island Reservoir, the power output from the applicant's plant during low flow periods would be increased by as much as 300 percent and the dependability of the plant improved materially. Furthermore, flood control operations at Buggs Island will increase the capability of the applicant's plant during flood periods by reducing the natural rise in tailwater. Suitable recompense to the U. S. should be obtained.

In view of the foregoing, it is recommended that the following terms and conditions be made a part of any license issued for this project:

(a) Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with said project, the licensee shall convey to the United States, free of cost, such of its lands and its rights-of-way and such right of passage through its dam or other structures and permit such control of pools as may be required to complete, maintain, and operate such navigation facilities.

(b) The licensee shall furnish free of cost to the United States, power for the operation of such navi-

gation facilities, whether constructed by the licensee or by the United States.

(c) The operation of any navigation facilities which may be constructed as a part or in connection with any dam or diversion structure built under the provisions of this license shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including the control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army. Such rules and regulations may include the maintenance and operation by the licensee at its own expense of such lights and signal as may be directed by the Secretary of the Army.

(d) The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation, and the operations of the licensee so far as they affect the use, storage and discharge from storage of waters affected by this license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interests of navigation.

[3651] (e) The top of the power pool of the Roanoke Rapids Reservoir shall be established at an elevation of 127 m. s. l. (If it is determined that there is a suitable dam site immediately upstream from the present Gaston site of which the available head can be developed as economically as at the Gaston site, and where a tailwater elevation of 132 feet above mean sea level would not be an impairment to operation, this restriction should be eliminated.)

(f) The licensee shall allow officers and employees of the United States free and unrestricted access in, through, and across the said project and project works in the performance of their official duties.

(g) The licensee shall permit the free use by the public for navigation or recreational purposes of the reservoir formed by said dam, and shall, when not inconsistent with the operation of said project, allow the construction of wharves or landings in the interest of navigation.

(h) The licensee shall cut and remove or destroy, to the satisfaction of the representative of the Commission, all brush and trees from the area to be submerged so that no brush or trees extend above an elevation 12 feet below the minimum power pool.

(i) The licensee will be required to operate its project in such a manner as the Chief of Engineers, Corps of Engineers, Department of the Army, or his authorized representative, may prescribe in order that the flood control and other benefits from present and future improvements under the jurisdiction of the Corps of Engineers as authorized by Congress in the Roanoke River Basin will not be nullified by operation of the licensee's project.

(j) The licensee shall have no claim against the United States arising from the effect on the proposed project of operation of the Buggs Island Reservoir or any intervening reservoirs that may be constructed by the United States at future dates.

(k) The licensee, in consideration of any benefits it may receive from headwater improvements of the

United States, shall reimburse the United States for such benefits.

The present plans of the structures appear satisfactory insofar as the interests of navigation are concerned. Approval of the plans in accordance with section 4 (e) of the Federal Power Act will be contingent upon examination of the tracings which you may submit at a later date.

One copy each of the original and amended applications are returned herewith as requested.

Very truly yours,

LEWIS A. PICK,
Major General, Chief of Engineers.

2 Incls.:
1 Cy Application.
2 Cy Amendment.

Exhibit 11

[3725] DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, 2 May 1949.

CHIEF, *Licensed Projects Division,*
Federal Power Commission, Washington, D. C.

DEAR SIR: Inclosed for your information is "Report on Investigation of Application of Virginia Electric and Power Company for License" prepared by the Norfolk District Engineer under date of 18 February 1949 and relating to the application of subject company for license for Project No. 2009 at Roanoke Rapids on Roanoke River, North Carolina.

The official report of this office, pertaining to this application, was forwarded to the Commission in letter dated 27 April 1949.

For the Chief of Engineers:
Very truly yours,

HUGH M. ARNOLD,
Lt. Col., Corps of Engineers,
Executive, Civil Works.

1 Incl.:
Cy Report.

* * * * *

953647—51—pt. 1——14

[3728] CORPS OF ENGINEERS,
U. S. ARMY,
OFFICE OF THE DISTRICT ENGINEER,
NORFOLK DISTRICT, FOOT OF FRONT STREET,
Norfolk 1, Virginia, 18 February 1949.

Subject: Report on Investigation of Application of Virginia Electric and Power Company for License to Develop a Hydroelectric Project on Roanoke River near Roanoke Rapids, N. C.

Thru: Division Engineer
North Atlantic Division
Corps of Engineers, U. S. Army
New York 3, N. Y.

To: Chief of Engineers
Department of the Army
Washington 25, D. C.

1. *Authority.*—This report is submitted in compliance with letter, Federal Power Commission to Chief of Engineers, dated 29 Oct. 48, relative to Federal Power Commission Project No. 2009—Virginia Electric and Power Company, and 1st and 2d Indorsements thereto.

2. *Scope.*—The report compares engineering data relative to several plans for developing the water resources of the Roanoke River in the vicinity of the Roanoke Rapids—Weldon area. In each instance the Buggs Island and Philpott Projects were assumed in operation. Analyses are based on low load factor

operation as instructed by higher authority and on the construction of the project with private funds.

* * * * *

[3740] C. ALTERNATIVE PLANS OF DEVELOPING SITE

37. *Plan as proposed in H. D. 650 (Plan D).*—Plates 4 and 7 show the plan proposed in House Document 650 for developing the water resources within the Roanoke Rapids—Weldon area. The plan included a concrete gravity type dam across Roanoke River, 0.57 miles upstream from the proposed VEPCO dam. The maximum power pool would be at elevation 127, five feet lower than the proposed VEPCO project. In order to develop the additional fall in the river between Roanoke Rapids and Weldon, the water would be diverted into a combined flume and canal, designed for a flow of 15,160 cubic feet per second, which will carry the water to a powerhouse located downstream from Weldon. The combined length of the flume and canal is 8.4 miles, and the length of the tailrace from the powerhouse to the river channel is 1.36 miles. A second powerhouse would be provided at the dam for the generation of electrical energy. The flow of water would be diverted into the existing VEPCO canal for generation of power at the Company's existing plant.

38. This plan permits the development of practically the entire fall of the Roanoke River within the Roanoke Rapids—Weldon area. The total installed capacity would be 106,300 kilowatts. The development would generate 370 million kilowatt hours of energy in an average year. During the critically dry

period of record, it would generate 175 million kilowatt hours of energy for on-peak use at a load factor of 18.8 percent.

39. *Plan for enlarging the existing canal (Plan B).*—Plates 8 and 9 show a plan for developing the water resources of the entire Roanoke Rapids—Weldon area. The plan would include (a) a dam across Roanoke River at mile 136.95, (b) enlargement of the existing canal for a distance [3741] of 7,000 feet, and (c) construction of a dam near Weldon at mile 130.53. A powerhouse would be located in the Roanoke Rapids Dam. The water would then flow through the enlarged canal to a second powerhouse at the downstream end of the canal in the vicinity of the existing powerhouse. A third powerhouse would be located in the Weldon Dam.

40. This plan permits the development of practically the entire fall of the Roanoke River within the Roanoke Rapids—Weldon area. The total installed capacity would be 111,600 kilowatts. The development would generate 388 million kilowatt-hours of energy in an average year. During the critically dry period of record, it would generate 184 million kilowatt-hours of energy for on-peak use at a load factor of 18.8 percent.

41. *Plan for tailrace excavation (Plan C).*—Plate 10 shows a plan for developing the head in the Roanoke River from the proposed VEPCO dam downstream to the highway bridge at Roanoke Rapids. This plan would include (a) a dam across Roanoke River at mile 136.95, (b) 8,200 feet of tailrace excava-

tion in the Roanoke River to an average depth of 35 feet and width of 70 feet, and (c) the existing canal and powerhouse. A powerhouse would be located in the Roanoke Rapids Dam. One unit would discharge into the existing canal and powerhouse.

42. This plan permits the development of 70 feet of head. An additional 23 feet of fall between tailwater level (as lowered by the excavation) and Weldon will remain undeveloped. The total installed capacity would be 95,500 kilowatts. The development would generate 332 million kilowatt hours of energy in an average year. During the critically dry period of record, it would generate 157 million kilowatt hours of energy for on-peak use at a load factor of 18.8 percent.

[3742] 43. *Summary of plans.*—Tables 4 and 5 present project data and an economic analysis for each of these plans. Cost estimates and designs are preliminary. Annual charges are based on private construction. The cost of producing equivalent power at new modern steam-electric plants in power supply area 18 has been used as a measure of the value of the power output. Preliminary values were furnished informally by the Federal Power Commission based on a cost of $158 per kilowatt of steam-electric capacity and an average cost of fuel at 35.6 cents per million B. t. u.

44. Table 5 presents an economic analysis of (a) Plans A, B, and C with power pool at 132 and (b) Plans A, C, and D with power pool at 127.

* * * * *

TABLE 5.—*Alternative plans for development of Roanoke Rapids site, Roanoke River, N. C., economic data*

[Buggs Island and Philpott projects constructed]

Item	Present development	Plan A—Dam and existing canal			Plan B—Dams at Roanoke rapids and Weldon, existing canal widened							Plan C—Dam and existing canal, 8,200 feet of tailrace excavated				Plan D—Dam and existing canal, 44,400 feet of canal to Weldon			
		Roanoke Rapids Dam	Existing powerhouse	Increment over existing development	Roanoke Rapids Dam	Roanoke Rapids Canal	Increment over existing development	Increment over plan A	Weldon Dam	Increment over existing development	Increment over plan A	Roanoke Rapids Dam	Existing powerhouse	Increment over existing development	Increment over plan A	Dam and canal	Existing powerhouse	Increment over existing development	Increment over plan A
Top of power pool		132			132							132				127			
Construction cost:																			
Dam and appurtenances		$8,288,000			$8,288,000				$5,890,000			$8,288,000				$7,520,000			
Land, clearing, and buildings		755,000			755,000				420,000			755,000				[2] 1,610,000			
Relocations and adjustments		267,000			267,000							267,000				1,060,000			
Canal, penstocks, and appurtenances						$2,630,000										[3] 21,440,000			
Tailrace excavation												4,440,000							
Powerhouse and switchyard		11,120,000			10,900,000	7,960,000			11,080,000			11,500,000				14,500,000			
Total first cost		20,430,000			20,210,000	10,590,000			17,390,000			25,250,000				46,130,000			
Interest during construction at 7.5 percent		1,532,000			1,516,000	794,000			1,304,000			1,894,000				3,460,000			
Total investment		21,962,000		$21,962,000	21,726,000	11,384,000	$33,110,000	$11,148,000	18,694,000	$51,804,000	29,842,000	27,144,000		$27,144,000	$5,182,000	49,590,000		$49,590,000	$27,628,000
Average annual charges:																			
Return on investment at 5 percent		1,098,000			1,086,000	569,000			935,000			1,357,000				2,480,000			
Amortization at 0.48 percent		105,000			104,000	55,000			90,000			130,000				238,000			
Taxes and insurance at 2.98 percent		654,000			647,000	339,000			557,000			809,000				1,478,000			
Replacement of expendable items		184,000			180,000	123,000			276,000			186,000				255,000			
Other operation and maintenance		163,000			150,000	95,000			68,000			227,000				348,000			
Total	[1]	2,204,000	[1]	2,204,000	2,167,000	1,181,000	3,348,000	1,144,000	1,926,000	5,274,000	3,070,000	2,709,000	[1]	2,709,000	505,000	4,799,000	[1]	4,799,000	2,595,000
Total in percent investment		10.04			9.97	10.37			10.30			9.97				9.68			
Average annual benefits:																			
Capacity at $23.40 per kilowatt	$145,000	$1,711,000	$115,000		$1,493,000	$782,000			$337,000			$2,415,000	$115,000			2,547,000	$145,000		
Energy at 4.05 mills per kilowatt-hour	211,000	998,000	158,000		895,000	474,000			202,000			1,185,000	160,000			1,387,000	112,000		
Present development			−356,000			−356,000							−356,000				−356,000		
Total	356,000	2,709,000	−83,000	2,626,000	2,388,000	900,000	3,288,000	662,000	539,000	3,827,000	1,201,000	3,300,000	−81,000	3,219,000	593,000	3,734,000	−99,000	3,635,000	1,009,000
Average annual excess benefits				422,000			−60,000	−482,000	−1,387,000	−1,447,000	−1,869,000	591,000	−81,000	510,000	88,000	−1,065,000	−99,000	−1,164,000	−1,586,000
Economic ratio				1 to 1.192			1 to 0.98	1 to 0.58	1 to 0.28	1 to 0.73	1 to 0.39	1 to 0.28	1 to 0.73	1 to 1.188	1 to 1.174			1 to 0.76	1 to 0.39
Top of power pool		127										127				127			[4]
Total investment		$21,040,000		$21,040,000								$26,217,000		$26,217,000	$5,177,000	$49,590,000		$49,590,000	$23,373,000
Total average annual charges		2,109,000		2,109,000								2,618,000	[1]	2,618,000	509,000	4,799,000	[1]	4,799,000	2,181,000
Total average annual benefits		2,453,000	−83,000	2,370,000								3,049,000	−81,000	2,968,000	598,000	3,734,000	−99,000	3,635,000	667,000
Average annual excess benefits				261,000								431,000	−81,000	350,000	89,000	−1,065,000	−99,000	−1,164,000	−1,514,000
Economic ratio				1 to 1.12										1 to 1.14	1 to 1.18			1 to 0.76	1 to 0.31

[1] Approximately constant for all schemes and used as zero in this analysis.
[2] Includes land and clearing for canal.
[3] Includes $15,850,000 for excavation, $2,110,000 for concrete, $2,830,000 for penstocks, and $650,000 for miscellaneous items.
[4] Increment over plan C with maximum power pool elevation = 127.

[3748] TABLE 6.—*Comparison of plans A, B, C, and D for developing Roanoke Rapids—Weldon area*

[Buggs Island and Philpott projects constructed]

	Plan A	Plan B	Plan C	Plan D
Dam at river mile	136.95	136.95 and 130.53	136.95	137.52.
Existing canal	Used	Widened	Used	Used.
Tailrace excavation, length in feet	200	100 at each plant	8,200	7,200.
Number of power plants	1 existing 1 new	1 existing 1 new	1 existing 1 new	1 existing. 2 new.
Top of power pool, feet above mean sea level.	132	132	132	
Dependable capacity at 18.8 percent load factor, kilowatt.	78,000	111,600	95,300	
Average annual total power output, kilowatt-hours.	286,000,000	388,000,000	332,000,000	
Prime energy for on-peak use, kilowatt-hours.	129,000,000	184,000,000	157,000,000	
Cost	$20,430,000	$48,180,000	$25,250,000	
Total annual benefits (1)	$2,626,000	$3,827,000	$3,219,000	
Total annual charges (2)	$2,204,000	$5,264,000	$2,709,000	
Excess annual benefits over charges	$422,000	−$1,447,000	$510,000	
Economic ratio, costs to benefits	1 to 1.19	1 to 0.73	1 to 1.19	
Top of power pool, feet above mean sea level.	127		127	127.
Dependable capacity at 18.8 per-percent load factor, kilowatt.	71,200		83,700	106,500.
Average annual total power output, kilowatt-hours.	262,000,000		268,000,000	370,000,000.
Prime energy for on-peak use, kilowatt-hours.	117,000,000		138,000,000	175,000,000
Cost	$19,570,000		$24,390,000	$46,130,000.
Total annual benefits [1]	$2,370,000		$2,968,000	$3,635,000.
Total annual charges [2]	$2,109,000		$2,618,000	$4,799,000.
Excess annual benefits over charges	$261,000		$350,000	$1,164,000.
Economic ratio, costs to benefits	1 to 1.12		[3] 1 to 1.14	1 to 0.76.

[1] Excluding benefits which would accrue to existing plant without further development at Roanoke Rapids.

[2] Excluding charges on existing plant which will be essentially constant for all plans.

[3] Economic ratio is 1 to 1.06 if extensive tailrace excavation is not accomplished at this time but units are installed to take advantage of additional head.

[3749] 50. Table 6 indicates that neither Plan B nor Plan D are economically justified for private construction. Table 5 shows that the portion of Plan B (exclusive of the Weldon dam) which develops the same section of river as Plan C is also not justified. Plan A, which is practically the same as the plan recommended by VEPCO, is economically justified. Plan C is as economically feasible as Plan A and

develops 15 feet of head in the stream in addition to that developed under Plan A. This leaves only 23 feet of head in the Roanoke Rapids—Weldon reach still undeveloped.

DIRECT EXAMINATION

[95] Q. Are you familiar with the report of the Corps of Engineers, U. S. Army, Office of the District Engineer, Norfolk, Virginia, entitled, "Roanoke River Basin, Va.-N. C.—Roanoke Rapids Development (F. P. C. Project No. 2009)—Report on Investigation of Application of Virginia Electric and Power Company for License," dated February 18, 1949, and with the letter of April 27, 1949, from the Chief of Engineers to the Federal Power Commission?

A. Yes, I am.

Q. Those are the documents, I believe, which have been listed as Exhibits No. 8 and No. 11 in this proceeding?

A. Yes.

Q. What, in your judgment, are the more significant features of this report, that is, the report of the Army Engineers, and this letter with respect to the application for a license, as amended in this proceeding?

A. This report shows that under present conditions the plan included with House Document 650 is not feasible and would be uneconomic. It finds that the plan included in applicant's amended application now on file is economically justifiable. The letter of April 27, 1949, with the suggestion of certain license condi-

tions states that the proposed project is a satisfactory development.

* * * * *

CROSS-EXAMINATION

[350] By Mr. HANKIN:

Q. Mr. Strandberg, on page 95 of the transcript you stated, with reference to Exhibit 11:

"This report shows that under the present conditions the plan included with House Document 650 is not feasible and would be uneconomic."

A. What exhibit did you refer to?

Q. Eleven, marked for identification as Exhibit 11.

A. Yes, sir.

Q. I referred you to page 95 of the transcript where you made that statement.

A. Yes, sir.

Q. Is that correct?

A. "This report shows that under the present conditions the plan included with House Document 650 is not feasible and would be uneconomic." I stated that.

Q. Would you like to correct that statement?

A. No, sir.

Q. Where in that report is the plan of the Army Engineers included in House Document 650?

A. Plan B—no, Plan D, page 16.

Q. Where in that report do you find a statement that the [351] plan included in House Document 650 is not feasible?

* * * * *

The WITNESS. I stated, "This report shows that under the present conditions the plan included with House Document 650 is not feasible and would be uneconomic."

And in that report it shows a ratio of benefits, as compared to costs by steam, of less than 1 to 1.

Mr. MOORE. Which report are you referring to here, Mr. Strandberg?

The WITNESS. The Army report, which was put in as Exhibit 11. It is the report dated the——

Mr. MOORE. April 27th?

The WITNESS. February 18, 1949.

By Mr. HANKIN:

Q. Now, Mr. Witness, will you tell me whether this project, Plan D, in Exhibit 11, is the same plan as is included in House Document 650?

A. It is the same, as far as location and type of development, but increases the capacity and size of the canal.

Q. Would you say that is the same plan, or a different [352] plan?

A. It is not exactly the same plan. It is a similar plan, but based on an increased capacity, on the assumption that you can use more flow.

Q. What do you mean by the same, but different?

A. One had about fifty-some thousand horsepower, whereas, this one has considerably more capacity installed.

* * * * *

[353] The WITNESS. The total capacity shown in Plan D is about 92,800 kw., as compared, I believe, to 57,000 kw. in the original plan.

By Mr. HANKIN:

Q. And you still say they are the same plan?

A. I did not so state.

* * * * * *

Q. Is that the only difference in the two plans?

A. It is a larger canal and a bigger capacity.

Q. If you are going to have a larger canal and a bigger capacity, can you say that the bigger plant is not feasible, and that that is the same as saying that the smaller plant is not feasible?

CHIEF PRESIDING EXAMINER. That is argumentative, clearly. He has given you, in his own words, what he thinks about it. His answer was very clear. I do not think you ought to argue with him.

Mr. HANKIN. If that is the case, your Honor, what I would like the witness to do is this, and I shall help him do it—because I am anxious to get the facts straight in this record; I have no other object here. I have listed here the differences [354] between the two projects. I am going to hand a copy to the witness and ask him to tell me whether these are not really the differences between these two projects. I shall also give copies to counsel and to the Examiner, so that everybody will be able to follow.

The figures underscored are figures where there are differences. The figures that are not underscored are the same in the two projects.

* * * * * *

[355]

Mr. HANKIN. I am prepared to ask him to state what are the similarities and what are the differences between these two projects: No. 1, Plan D, which is

in Exhibit 11, and the plan which was included in House Document 650, which he said in accordance with the Exhibit 11 was now uneconomic and not [356] feasible.

* * * * *

The WITNESS. I would have to assume that these figures were right.

* * * * *

[357] CHIEF PRESIDING EXAMINER. The paper that you handed him as a basis for the comparison you requested him to make is your paper, is it not?

* * * * *

Mr. HANKIN. Yes.

CHIEF PRESIDING EXAMINER. Had he ever seen it before?

Mr. HANKIN. No, I am handing it to him now. He can take his time to answer it.

CHIEF PRESIDING EXAMINER. Mr. Strandberg, if you could answer Mr. Hankin's question with your present knowledge, sitting on the witness stand, you may do so. You are now on cross-examination as to the knowledge you now have in your head with respect to the information you now possess. I will not require you to make a comparison that would consume considerable time on the witness stand. But if you are now able to answer the ques-[358]tion, I rule that it may be answered. If it involves a computation that is going to take a large amount of time, or any considerable time, then it is not practicable to do that on the witness stand. Then counsel may consider any other request Mr. Hankin wants to make in that connection.

First, I will ask you, Mr. Strandberg, can you answer Mr. Hankin and make the comparison he desires with the knowledge that you now possess?

The WITNESS. I cannot.

CHIEF PRESIDING EXAMINER. That is the answer. If you desire to make any further request, that would be another thing.

Mr. HANKIN. If that is the case, then I shall have to ask Mr. Strandberg to make a comparison of all the features, of all the engineering data pertaining to Plan D, and to the exhibit included in House Document 650, and tell me whether he is talking about the same project.

* * * * *

[359] CHIEF PRESIDING EXAMINER. Now, Mr. Hankin, of course you can put on evidence yourself to show the comparison. The applicant has not prepared a comparison such as you want.

* * * * *

TESTIMONY OF MR. SUNDRA

DIRECT EXAMINATION

[581] Q. Mr. Sunda, I refer you to Exhibit 11 marked for identification which is a report prepared by the Corps of Engineers in connection with the application for license for Project No. 2009. Do you have a copy of this exhibit?

A. Yes.

Q. What was the basic study made in this report?

A. The District Engineer considered four alternative plans for developing the water resources of

the Roanoke River for the Roanoke Rapids-Weldon area.

Q. What were the alternative plans?

A. Plan A considered a project similar to that proposed by the power company in its initial application for license for Project No. 2009 and the existing power project; Plan B considered a project similar to that proposed by the power company but, in addition, included the enlargement of the existing power canal and power plant and a project at Weldon, North Carolina; Plan C considered a project similar to that proposed by the power company in its amendment of application [582] for license for Project No. 2009, that is, it included an excavated tailrace so as to provide for additional head. It also included the existing power project.

Plan D considered a project similar to that proposed in House Document 650 except that the hydraulic capacity of the canal and the installed capacity of the powerhouse at the end of the canal were increased. The existing project also was included.

Q. Can you give us the conclusions of the Army Engineers report?

A. The conclusions are:

(1) Neither Plan B nor Plan D are economically justified for private construction;

(2) Plan A is economically justified, and

(3) Plan C is as economically feasible as Plan A and develops about 15 feet of head in the stream in addition to that developed under Plan A.

Q. Have you reviewed the various reports of the Army Engineers?

A. I have.

Q. Do you concur in the conclusions of the Corps of Engineers as outlined in Exhibit 11 for identification?

A. I do.

* * * * *

Cross-examination by Mr. HANKIN:

[712] Q. As an engineer, would you say that a power plant having a total generating capacity of 100,300 kw. is substantially the same as one having a capacity of 58,800 kw?

A. I didn't get the first quantity there.

Q. As an engineer, would you say that a power plant [713] having a total generating capacity of 100,300 kw.——

A. 100,300 kw.?

Q. Right; is substantially the same as one having a capacity of 58,800 kw.

A. The difference would be only in the size of the powerhouse and utilization of the water.

Q. Will you answer my question? Would you say they are substantially the same?

A. I can't answer that question as it stands. I must know other factors in consideration of the project besides the size of installation.

CHIEF PRESIDING EXAMINER. You can answer the question yes or no to start with, can you not? Could it be the same?

Mr. GATCHELL. I would think not, your Honor. He said he could not. I would think he is perfectly within his rights in refusing to answer that question.

CHIEF PRESIDING EXAMINER. It seems to me the answer is obvious.

Mr. GATCHELL. I respectfully suggest, your Honor, it is not obvious. This witness has himself pointed out that he needs other factors which have not been given to him by Mr. Hankin.

* * * * * *

[714] CHIEF PRESIDING EXAMINER. Then the answer, of course, is obviously that it is not exactly the same. Very well, you may proceed.

By Mr. HANKIN:

Q. Would you say that a power plant having a turbine capacity of 126,000 horsepower is substantially the same as one having a turbine capacity of 71,000 horsepower?

A. The same answer would apply. There would be only a difference in the size of the power house and the utilization of the water.

Q. And the answer is in that case yes or no?

A. I can't answer without knowing other factors.

Q Supposing all of the other factors are the same?

A. The project would not be substantially different.

Q. Would not be?

A. Would not be.

Q. Very well, would you say that a plant having an average tailwater elevation of 37 feet is substantially the same as one having a tailwater elevation of 29 feet?

A. I don't get the significance of the question.

Q. Do you understand the question?

A. I don't understand the question.

* * * * * *

[715] A. The project may well be the same, insofar as its capacity installation is concerned.

Q. And so, is your answer yes or no?

A. I can't answer that question yes or no.

* * * * *

[716] Q. Mr. Sunda, are you sufficiently familiar with the plan in House Document 650 relating to Roanoke Rapids and Plan D in Exhibit 11, to say whether I have asked you to compare the characteristics of the two projects?

A. I am familiar with both projects.

Q. Have I asked you to compare the characteristics of the two projects?

A. On two or three points, yes.

Q. Has Plan D in Exhibit 11 been approved by Congress as part of a comprehensive plan of development?

A. To my knowledge it has not.

Q. I direct your attention to Exhibit 11, page 13, and ask you whether or not Plan D is designated as the plan included in House Document 650 and whether this is a correct designation.

A. With certain modifications, the project in Plan D is the same as in 650.

Q. First, Mr. Witness, answer my question yes or no, then you can explain your answer.

A. I cannot answer that question yes or no. The project is basically the same project. With certain modifications it has been changed.

Q. You mean by that the project is the same only different, is that it?

A. It is essentially the same project.

Q. It is the same project?

[717] A. Essentially the same project.

* * * * *

[722] Q. Now, on page 577 you state the applicant's project is more economical. How did you arrive at that conclusion?

A. The cost of the project shown in Exhibit 11 for Plan D showed the project to be uneconomical for private development. As I mentioned before, this project is similar to the project in House Document 650. On that basis the project was not shown to be economical for private development.

Q. Are you now confusing Plan D with the plan in House Document 650?

A. I am not confusing it, no.

Q. But you are interchanging them?

A. To a certain extent, yes.

Q. I am asking the question with reference to the plan contained in House Document 650. I am not asking you any question with reference to the plan contained in Exhibit 11, so please answer my question in accordance with what you have testified. You compared those two projects.

A. We made no estimate for the cost or economy of the project for Roanoke Rapids in House Document 650, for the reason, the apparent reason, that the project submitted by the applicant was more economical and better adapted to the comprehensive development of the river.

Q. Mr. Sunda, that may be an answer to some other question, but what I asked you is: How did you arrive at your conclusion when you stated that

the applicant's project is more [723] economical than the one contained in House Document 650?

A. It was concluded on the basis I have just given you.

Q. And that is what?

A. That the project as shown in Exhibit 11, Plan D, was uneconomical and it is similar to the plan shown in House Document 650.

Q. But when you testified that as between the two projects mentioned, you did not compare it with data in order to arrive at your conclusion, is that correct?

A. That may be correct.

Q. That is correct, you say?

A. I don't understand the question.

* * * * *

[724] Q. Mr. Sunda, you just testified that the firm energy of the applicant's project is 175 million kw-h.; that for the project in House Document 650 it is 151 million kw-h.; that the cost of the applicant's project is over $27,000,000, in fact, $27,233,000; that the cost, as given for the project in House Document 650 is $11,630,000. Then I called your attention to the fact that in comparing the two projects, you stated on page 577, that the applicant's project is more economical. All I want to know is how you arrived at this conclusion.

* * * * *

The WITNESS: In arriving at the conclusion we used the report of the Army Engineers, Exhibit 11, Plan D, which is a project similar to the one in 650. The project in 650 and the data there cannot be used inas-

much as economic conditions [725] have changed considerably since that report was prepared.

By Mr. HANKIN:

Q. In other words, when you compared the data on pages 575 and 576, you substituted Plan D in Exhibit 11 for the project set forth in House Document 650 in order to arrive at your conclusion that the plan in House Document 650 would not be economical?

A. Not entirely.

Q. Less economical?

A. Not entirely, no.

Q. Then please give me the details of the manner in which you arrived at your conclusion.

A. Insofar as the economy is concerned, yes. The other factors in answer to that question are as shown there.

Q. Are we to guess which part you did take into consideration and which part you didn't?

A. The answers are very clear here in comparing the two projects.

Q. Provided you substitute Plan D for the plan contained in House Document 650, is that correct?

A. No.

Q. Well, then, please give a full statement of how you arrived at that conclusion when comparing House Document 650 with the applicant's project.

A. Are you referring to the answer on transcript page [726] 576? The facts given there, except the answer—the comparison given there, or the advantage given for Project 2009 over the project in House Document 650, are as shown in that particular answer on pages

576 and 577. The question of economy was derived in a roundabout manner, as I have outlined?

Q. What is that roundabout manner?

A. The project, and again I refer to Exhibit 11, Plan D ——.

Q. Now, Mr. Witness, let us be perfectly frank with each other, because I am not trying to take advantage of anything. Look at page 576. You say on page 576, in your paragraph 4, comparing the characteristics, that the installed capacity of Project 2009 would be 91,000 kw., whereas, the project outlined in House Document 650 would have an installed capacity of 58,000 kw. Now, surely, you must admit the project in House Document 650 and not in Plan D.

A. That is in House Document 650, that is right.

Q. Because the plan in Plan D calls for 100,300 kw.?

A. Something like that, yes, sir.

Q. Now, then, among the conclusions you arrived at on page 577, you said that as between the two projects, the project of the applicant is more economical.

A. That is correct.

Q. All I am asking you is how you arrived at that con-[727]clusion.

A. I mentioned before that the project in House Document 650 and Plan D in Exhibit 11 are similar projects, their only difference being, as I pointed out, the size of the canal and the size of the powerhouse. An economic comparison is possible.

[728] Q. Didn't you state that in your answer on direct examination?

A. I stated the project was more economical.

Q. And the basis of your comparison was what?

A. By my method of deduction.

Q. As stated on page 576, what was the basis of the comparison?

A. I have already given that answer.

Q. State it again.

A. The Plan D in Exhibit 11 was used as a basis.

Q. Mr. Witness, I asked you to refer to page 576 and give me the basis of the comparison stated there.

A. Between project 2009 and House Document 650?

Q. When you say "House Document 650," do you mean Plan D, or the House Document——

A. I meant House Document 650.

* * * * * * *

[4057] Exhibit 45

Roanoke Rapids—Comparative data on project

	Plan D, exhibit 11	H. D. 650
Dam location—Miles above mouth of River.	137.52	137.52.
Length of canal	44,400 feet	44,000±.
Length of dam	2,900 feet	2,900±.
Spillway:		
Length of gated section	740 feet	740 feet.
Length of ungated section	895 feet	895 feet.
Maximum height of dam	79 feet	79 feet.
Gates:		
Number	15	15.
Size	12 x 40	12 x 40.
Structure elevations feet above mean sea level:		
Top of dam	147	147.
Top of gates	127	127.
Spillway crest, gated section	115	115.
Spillway crest, ungated section	127	127.
Reservoir:		
Area at maximum pool	3,800 acres	3,800 acres.
Pondage	7,600 acre-feet	7,100 acre-feet.
Reservoir elevations feet above mean sea level:		
Maximum for free discharge	142	142.
Maximum power pool	127	127.
Minimum power pool	125	125.

Roanoke Rapids—Comparative data on project—Continued

	Plan D, exhibit 11	H. D. 650
Tailwater elevation average:		
Dam	83	85.
Canal	37	39.
Average head for power, dam:		
Gross	44 feet	42 feet.
Net	41.5 feet	39 feet.
Average head for power, canal:		
Gross	88 feet	96 feet.
Net	81.5 feet	89.5 feet.
Power plant, water capacity:		
Dam, total	2,940 cubic feet per second	3,000 cubic feet per second.
Canal, total	15,160 cubic feet per second	7,800 cubic feet per second.
Power plant, turbine capacity:		
Dam, each unit	12,600 horsepower	5,900 horsepower.
Dam, total	12,600 horsepower	11,800 horsepower.
Canal, each unit	31,500 horsepower	23,700 horsepower.
Canal, total	126,000 horsepower	71,100 horsepower.
Power plant, generator capacity:		
Dam, each unit	9,100 kilowatts	4,200 kilowatts.
Dam, total	9,100 kilowatts	8,400 kilowatts.
Canal, each unit	22,800 kilowatts	16,800 kilowatts.
Canal, total	91,200 kilowatts	50,400 kilowatts.
Total	100,300 kilowatts	58,800 kilowatts.
Canal, capacity	15,160 cubic feet per second	7,800 cubic feet per second.
Bottom width:		
Unlined section	112 feet	30 feet.
Lined section	55 feet	40 feet.
Width, flume	70 feet	50 feet.
Tailrace—Canal: Bottom width	288 feet	180 feet.

ECONOMIC DATA

	Plan D, Exhibit 11	H. D. 650
Construction investment	$49,590,000	$11,970,000
Annual charges	4,799,000	571,200
Annual benefits	3,635,000	1,533,000
Excess annual benefits	−1,164,000	961,800
Economic ratio	1:0.76	1:2.60

[4058] Exhibit 46

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, 24 May 1949.

Mr. WALTON SEYMOUR,
Chief, Division of Power, Department of the Interior,
Washington, D. C.

DEAR SIR: Reference is made to Mr. Wigglesworth's telephone request, this date, for the present estimated construction cost and estimated annual operation and maintenance cost for a hydroelectric development at the Roanoke Rapids site on the Roanoke River, North Carolina, similar to that recommended in House Document 650, 78th Congress.

Based on an installed capacity of 50,400 kw. at the end of the Weldon Canal and 8,400 kw. at the Roanoke Rapids dam, with the maximum water surface above the dam at elevation 127, the dam located at river mile 137.52, the Weldon power house located opposite river mile 129.5, and with dam, canal and appurtenant works all identical to that recommended in House Document 650, the District Engineer has estimated the cost of such a project at $31,120,000, based on prices prevalent in January 1949. He has also estimated the average annual cost of replacement of expendable items at $130,000 and the average an-

nual cost of all other operation and maintenance costs at $242,000.

For the Chief of Engineers:

Sincerely yours,

W. E. POTTER,
Colonel, Corps of Engineers,
Acting Assistant Chief of Engineers
For Civil Works.

[4071] Exhibit 53

Ratio of annual benefits to charges (costs) all 11 developments—Roanoke River, pages 7–8, House Document No. 650

Project	Annual benefits	Annual charges	Ratio
Buggs Island	$1,965,900	$1,455,500	1.35
Gaston	1,390,700	601,200	2.32
Roanoke Rapids	1,481,600	571,200	2.60
Smith Mountain	604,800	583,800	1.04
Leesville	234,100	173,590	1.35
Taber	175,700	162,200	1.08
Melrose	566,400	425,700	1.33
Randolph	387,200	403,000	.96
Philpott	326,700	227,800	1.44
Stuart	182,000	173,400	1.05
Schoolfield	377,300	446,000	.84
Total	7,692,400	5,223,390	1.47
Ratio of benefits to charges			1.47

ELIMINATING ROANOKE RAPIDS

Total benefits	$7,692,400
Less Roanoke Rapids	1,481,600
Balance	$6,210,800
Total charges	$5,223,300
Less Roanoke Rapids	571,200
Balance	$4,652,100

Ratio of benefits to charges of comprehensive development of the Roanoke River, less the Roanoke Rapids development: $\frac{6,210,800}{4,652,100}=1.34$.

Exhibit 54

Roanoke Rapids project, economic feasibility study, Government financing

	Plan D, exhibit 11	Roanoke Rapids, R. D. 650
Capacity in plant, kilowatts	[3] 100,300	[3] [6] 58,800
Average energy, kilowatt-hours	[3] 342,400,000	[5] 326,700,000
Construction cost	[3] $46,139,000	[4] $31,120,000
Interest during construction [1]	1,384,000	934,000
Total investment	47,514,000	32,054,000
Interest [1]	950,000	641,000
Amortization [2]	441,000	298,000
Operation and maintenance	[3] 348,000	[4] 242,000
Total yearly costs	1,739,000	1,181,000
Capacity value $23.40/kilowatts [3]	[3] 2,347,000	1,376,000
Energy value 4.05 mills [3]	[3] 1,387,000	1,323,000
Total yearly benefits	3,734,000	2,699,000
Excess yearly benefits over costs	1,995,000	1,518,000
Ratio benefit/cost (percent)	2.15	2.29

[1] Interest 2 percent.
[2] 58 years sinking fund 2 percent interest.
[3] Army Engineers exhibit 11.
[4] Army Engineers letter May 24.
[5] Coltrin, Army Engineers 1949.
[6] House Document 650.

[4073] **Exhibit 55**

Ratio of annual benefits to charges (costs) all 11 developments—Roanoke River, pages 7–8, House Document No. 650

Project	Annual benefits	Annual charges	Ratio
Buggs Island	$1,965,900	$1,455,500	1.35
Gaston	1,390,700	601,200	2.32
Roanoke Rapids	1,481,600	571,200	2.60
Smith Mountain	604,800	583,800	1.04
Leesville	234,100	173,500	1.35
Taber	175,700	162,200	1.08
Melrose	566,400	425,700	1.33
Randolph	387,200	403,000	.96
Philpott	326,700	227,800	1.44
Stuart	182,000	173,400	1.05
Schoolfield	377,300	446,000	.84
Total	7,692,400	5,223,300	1.47
Ratio of benefits to charges			1.47

ELIMINATING ROANOKE RAPIDS AND GASTON

Total benefits	$7,692,400
Less Roanoke Rapids and Gaston	2,872,300
Balance	4,820,100
Total charges	5,223,300
Less Roanoke Rapids and Gaston	1,171,200
Balance	4,052,100

Ratio of benefits to charges of comprehensive development of the Roanoke River, less the Roanoke Rapids and Gaston developments: $\frac{\$4,820,100}{\$4,052,100}=1.19$.

Testimony of Mr. Wigglesworth

Direct Examination

[899] Q. I have asked you to prepare an exhibit entitled, "Roanoke Rapids comparative project data" which is now marked for identification as Exhibit 45. Have you prepared that exhibit?

A. I have.

Q. Do you have it before you?

A. Yes, I do.

Q. From the data listed there, would you say that Plan D in Exhibit 11, and the plan included in House Document 650 relate to the same project?

A. No, I would say they do not.

Q. I refer you to page 13 of Exhibit 11, and ask you whether the designation as given on the first line, namely, "Plan as proposed in House Document 650, Plan D," is a correct designation?

A. No, I would say it is not.

Q. Would you explain why you say it is not?

A. On the basis of the comparison shown on the exhibit they are substantially different projects.

Q. If the Army Engineers came to the conclusion that the project in Plan D is not feasible and is uneconomical, does that mean that they found the plan contained in House Document 650 infeasible or uneconomical?

* * * * * *

[901] The WITNESS. No, it does not.

CHIEF PRESIDING EXAMINER. In your opinion?

The WITNESS. In my opinion.

By Mr. HANKIN:

Q. Mr. Wigglesworth, in your opinion is there room for a difference of opinion on that question?

* * * * * *

The WITNESS. The project, shown as Plan D in Exhibit 11, is a project on the same general plan as the project shown in House Document 650. But the fact that there is so much more generating capacity included in the project shown in Plan D, which in turn requires so much larger canal and canal trailrace,

which would result in a substantial difference in cost, I would say that for the purpose of economic comparison, that there is no—that I cannot see why the two projects could be considered the same.

By Mr. HANKIN:

Q. I am referring you to page 95 of the transcript in which Mr. Strandberg testified:

[902] "This report shows that under present conditions the plan included with House Document 650 is not feasible and would be uneconomic." Which report is he referring to?

A. He is referring to Exhibit 11.

Q. And would you say that the statement made by Mr. Strandberg is correct?

A. No, in my opinion it is not correct.

Q. In preparing this exhibit, Mr. Wigglesworth, what sources did you use?

A. I used Exhibit 11 and I used House Document 650, together with the appendices to that document consisting of the plates and some textual material. I used specifically the appendix on project data.

Q. Do you have this source material available for examination by counsel for the applicant and for the Commission?

A. I have the plates here, but unfortunately one of the other members of the Division of Power has taken the other appendix home with him.

Q. Can you make it available some time tomorrow?

A. Yes, it can be made available tomorrow.

Q. Very well. I also ask you to refer to Exhibit marked for identification as Exhibit No. 46. What does that show?

A. That is a letter, dated the 24th of May 1949, signed by the Acting Assistant Chief of Engineers for Civil Works, [903] for the Chief of Engineers, directed to Mr. Walton Seymour, Chief, Division of Power, Department of the Interior, Washington, D. C.:

"DEAR SIR:——

* * * * *

Q. What I would like to ask you is to state what significant point is there in that letter?

A. The significant point of that letter is that the cost as estimated by the District Engineer for the project as shown in House Document 650, his present estimate of cost of such a project is $31,120,000.

Q. Now, if you will look at Exhibit 45 again, which figure would that displace?

A. That would displace the figure under—I don't believe it would actually displace either one of those. The cost as given in the letter from the Corps of Engineers is, I believe, the construction cost.

* * * * *

The WITNESS. The District Engineer has estimated the cost of such a project at $31,120,000.

* * * * *

[904] Q. Now, Mr. Wigglesworth, perhaps I did not make my question clear to you. On Exhibit 45, do you have any figures showing the construction cost of the project in Plan D and the one in House Document 650?

A. There is one entitled, "Construction investment of $11,970."

Q. You mean eleven million?

A. $11,970,000, which, in accordance with the general practice of the Corps of Engineers in that term investment it includes interest during construction. The thirty-one million, as I understand it, does not include interest during construction.

Q. You say you understand it, or do you know it?

A. I don't know for sure.

Q. Then say that you don't know.

Which figure does that correspond to?

* * * * * *

[905] Q. Now, if you replaced that $11,000,000 figure with the $31,000,000 figure, would the comparison still show that it is the same or a different project?

A. The fact that there is a difference in the cost of the project has no bearing on whether or not—I would like to change that.

The fact that there is a difference in the cost of the project is not a conclusive showing that the projects are not [906] the same. In this case the difference in cost of the project is due to changed circumstances, and not to a changed project.

* * * * * *

CROSS EXAMINATION

[930] Mr. MOORE. * * * I simply first wanted to inquire as to whether or not the figure on Exhibit number 45, which you see at the bottom of the page, $11,970,000, is to be compared precisely with the figure of $31,120,000, which is referred to in the paper marked for identification Exhibit number 46. Are those comparisons of the same thing?

The WITNESS. No, sir. I would add interest during construction to the $31,000,000 before comparing it with the $11,000,000 figure.

Mr. MOORE. Excepting that item of interest during construction are the comparisons of precisely the same thing?

The WITNESS. Yes, sir.

Mr. MOORE. Then any difference in the two figures arises entirely out of changes of prices in comparing the two dates as of which the prices were used?

The WITNESS. That is correct.

* * * * *

[931] Mr. MOORE. In regard to the paper marked Exhibit number 46, are we to understand that there was a report made by the district engineer? You will notice that paper said, "The district engineer has estimated the cost of such a project." Is there such a report?

The WITNESS. I can only testify of my own knowledge, to the fact that I was given this figure of $31,120,000 over the telephone several weeks ago. I believe it was before the hearing started.

Mr. MOORE. By whom were you given it?

The WITNESS. I was given that information by an employee in the office of the Chief of Engineers, Mr. Kenneth Coltrin.

* * * * *

[1302] By Mr. GATCHELL:

Q. Would you mind taking Exhibit 45? Do you have that there?

A. Yes, sir.

Q. Is the dam site for each of these two projects, Plan D and the Roanoke Rapids House Document 650, is the dam site the same in each case?

A. It is the same dam site, yes, sir.

Q. Are the dams identical?

A. So far as the information I have it shows they are identical.

Q. Is the center line of the water conduit the same?

A. I don't know.

Q. Didn't you make a study to find out?

A. So far as I know that information wasn't shown in Plan D, Exhibit 11, at least I didn't compare that if it was.

Q. You didn't find it if it was?

A. No.

Q. Are the reservoirs identical, or not?

A. The dam being at the same height and at the same location, the reservoir would be the same.

Q. Are the power houses in the same location?

[1303] A. So far as I know the power houses are at approximately the same location.

Q. Are the water conduits of the same size?

A. No, they are not.

Q. Which one is larger?

A. The one in Plan D is larger.

Q. And is the power installation in Plan D larger than the one in House Document 650?

A. Yes, it is.

Q. With the exception of the size of the water conduits and the power installation are there any differences between the two?

A. The tailwater would be higher in Plan D.

Q. Is that a physical change, or merely by reason of the method of operation that would have to be followed?

* * * * * *

The WITNESS. That is due to the fact that there is more water released from the power plant in Plan D than from the one in House Document 650.

By Mr. GATCHELL:

Q. It is not due to any construction in the tailrace?

A. No, it is not due to construction in the tailrace. [1304] The tailrace in Plan D is somewhat larger than the tailrace in House Document 650, but it is not sufficiently of greater size to carry off the extra water without creating additional head.

Q. In Exhibit 45, you have a cost of $11,970,000 as the construction investment under House Document 650. Does that include the cost of the stepup transformers?

A. I don't know.

Q. Did you make any attempt to find out?

A. Did I?

Q. Did you?

A. No, I didn't.

Q. The figure of $49,590,000 as the construction investment under Plan D, does that include stepup transformers?

A. I am not sure.

Q. Is there some figure you could refer to quickly that would tell you?

A. Exhibit 11, I believe, the report of the Corps of Engineers.

Q. Do you have that with you?

A. I don't have it here.

Q. I will loan you my copy, if you want to see that.

A. I thought the answer was given on table 5, but I see it doesn't specifically say whether there is anything in there for transformers, or not.

Q. You are familiar with the appendices to House Document [1305] 650, are you not?

A. Yes, I am.

Q. Is this Volume 1 of the appendix to the Review Report, Roanoke River?

A. That is correct.

Q. I show you, under paragraph 64, Table A–6, does that show economic data, Roanoke Rapids project?

A. It does.

Q. Under "Economic data" it has "Capital costs," does it not, and on the last column on the right-hand side it has "Investment"?

A. Yes.

Q. What is the total of that investment?

A. $13,170,000, shown here.

Q. That is not the figure which you used, is it?

A. No, sir, it is not.

Q. How much is shown for stepup transformers and switch yards?

A. In the investment there is shown $1,200,000.

Q. If you should subtract $1,200,000 from $13,170,000, would you not get $11,970,000?

A. Yes, you would.

Q. That is the figure which you used in your Exhibit No. 45 as the cost of Plan D?

A. Yes.

[1306] Q. So that figure of eleven million—I said Plan D. That was House Document 650.

A. Yes, sir.

Q. I misstated myself. If you used $11,970,000 as the cost under House Document 650, then you did not include the stepup transformers, did you?

A. On the basis of what is shown there, I did not.

Q. Do you have Table 5 of Exhibit 11 before you? Was that the table you were just examining?

A. Yes, it was.

Q. Does that relate to Plan D? Does one of the columns in there relate to Plan D?

A. Yes, it does.

Q. You see in there, "Power house and switchyard."

A. I see that, yes, sir.

Q. If you follow that through for Plan D, what is the figure which is given?

A. $14,500,000.

Q. Did you say that includes switchyard?

A. It does include switchyard.

Q. It does?

A. Yes, it does.

Q. How about the stepup transformer?

A. It doesn't say whether it includes transformers or not.

[1307] Q. And you made no attempt to find out otherwise. You talked to Mr. Coltrin about some of these figures. Did you happen to ask him about this?

A. About the switchyard and transformers?

Q. Yes.

A. No, sir, I did not.

Q. This figure of $49,590,000, the construction investment under Plan D, did that include interest during construction?

A. Yes, that includes interest during construction.

Q. Is interest during construction included in the $11,970,000?

A. As I have it recorded here, it is construction investment, which would include interest during construction. I haven't checked that back to see.

Q. I think that is right, Mr. Wigglesworth, but I just want the record to be clear so we do not have some questions coming along later. Do you have House Document 650?

A. Yes, I think I do.

Q. Will you turn to page 7 of that report, please?

A. Yes, sir.

Q. In there don't they give the cost of construction as $11,630,000?

A. $11,630,000, yes, sir.

[1308] Q. Now, I showed you before this appendix to House Document 650. I now call your attention to the column in Table A–6, Economic Data, Roanoke Rapids Project, interest during construction, from which we have subtracted $20,000 for stepup transformers, and wouldn't that be $340,000 for interest?

A. Yes, it would.

Q. You add that to the $11,630,000, wouldn't that give you the total figure which you used, $11,970,000?

A. Yes, it would.

Q. So that would include interest during construction?

A. Yes.

Q. In both of them?

A. Yes.

Q. There is another figure given in your Exhibit No. 46 as the estimated cost of a project constructed at Roanoke Rapids in a manner which would be identical with the plan recommended in House Document 650. Do you see that?

A. Yes.

Q. It there gives the figure of $31,120,000 as the cost based on prices equivalent in January 1949.

A. Yes.

Q. Would you say that the figure of $31,120,000, as shown on Exhibit 46, would be comparable to the figure of $46,130,000 for Plan D that is shown in Table 5?

[1309] A. Yes, I would.

* * * * *

The WITNESS. They are both construction costs, without adding interest during construction.

Mr. HANKIN. You don't mean they are the same figure?

The WITNESS. No they are not the same figure.

By Mr. GATCHELL:

Q. In your conversation with Mr. Coltrin of the Office of Chief of Engineers that you referred to, did he tell you the output of the Roanoke Rapids project as planned in House Document 650?

A. No, he did not.

* * * * *

[1318] CHIEF PRESIDING EXAMINER. Well, you might read the question and answer.

The WITNESS. "Question: And would you say that the statment made by Mr. Strandberg is correct? "Answer: No, in my opinion it is not correct."

By Mr. GATCHELL:

Q. In what way is it incorrect?

A. Mr. Strandberg stated that the report, Exhibit 11, I believe he was referring to, showed that under present conditions the plan included with House Document 650 is not feasible and would be uneconomic. The report does not show that because the report or the plan, Plan D in Exhibit 11 is not the same project as the one in House Document 650.

* * * * *

[1319] By Mr. GATCHELL:

Q. You are not questioning his judgment as to the economic feasibility of any project by this statement that you have on page 902?

Mr. HANKIN. Are you questioning his judgment or his state[1320]ment?

The WITNESS. I questioned only his statement.

By Mr. GATCHELL:

Q. And not his judgment as to economic feasibility?

* * * * *

The WITNESS. No, sir; I was answering his question.

* * * * *

[1381] By Mr. MOORE:

Q. Are not the changes in flow capacity and power capacity at Buggs Island—confining it just to that—similar to changes in canal capacity and power capacity, as shown in Exhibit 11, Plan D, compared to the plan in House Document 650 for Roanoke Rapids?

CHIEF PRESIDING EXAMINER. The question is, are they, and can you answer that question, Mr. Wigglesworth?

The WITNESS. No, I would say they are not similar changes.

By Mr. MOORE:

Q. If the changes in Plan D, Exhibit 11, and House Document 650 are in the canal and power station capacities, is it not reasonable and a fairly simple matter for a competent engineer to make proportional adjustments in the estimated cost as shown for Plan D and use this adjusted cost in concluding that the House Document 650 plan is economical or uneconomical on the basis that the Army concludes that Plan D, as shown in Exhibit 11, is uneconomical?

* * * * *

The WITNESS. As I understand the question, would you increase the price proportionately for the increase in size of [1382] facilities. Is that the substance of it?

By Mr. MOORE:

Q. The question is, is it not reasonable and a simple matter for a competent engineer to make proportionate adjustments in the estimated cost, as shown in Plan D, and to use that adjusted cost in making a determination as to whether the House Document plan is economical or not, in the manner in which the Army deals with it?

* * * * *

[1383] The WITNESS. I can't give a direct yes or no answer; part of it is yes and part of it is no. That is, certain things would be a direct proportional in-

crease in price; certain other things might be changed by other circumstances.

By Mr. MOORE:

Q. You think that is a complete answer to my question?

A. I believe it is; yes, sir.

* * * * * *

Q. Mr. Wigglesworth, if the cost of the canal and the cost of the power station and equipment were adjusted in direct ratio to the capacity of the canal and the power station, would that not give a reasonable measure of the difference in cost in the two projects?

A. I don't know.

Q. Have you undertaken to make such a determination?

A. No, I have not.

Q. Then are we to understand before you testified on direct in this proceeding you made no computations to determine whether or not the House Document 650 project, based on January 1949 prices, would be a feasible project or not?

A. That is a correct assumption.

Q. Referring to your Exhibit 46, for a moment, do you [1384] have that?

A. Yes.

Q. I particularly call your attention to the estimated cost of the Roanoke Rapids project as described in House Document 650, based on prices in January 1949, that is, $31,120,000. If interest is

applied at the rate of 7½ percent, as shown in the amount of 7½ percent, as used by the Army Engineers in their report, Exhibit 11, page 18, would this not add approximately $2,344,000 to the estimate of $31,120,000, which you there used, and thus bring up the total investment to approximately $33,464,000?

* * * * *

The WITNESS. The interest at 7½ percent would be something between two million and two million five hundred thousand dollars, in that range. It would be over two million.

* * * * *

[1407] Redirect examination by Mr. HANKIN:

Q. Yesterday, on page 1301, 1311, 1312, 1314, and 1320, Mr. Wigglesworth, you were asked various questions concerning the feasibility of the Roanoke Rapids project in House Document 650 and you answered that you had not made any study of the feasibility of this project under the present costs. After the adjournment I asked you to make such a study of both Roanoke Rapids project in House Document 650 and in Plan D, Exhibit 11. Have you made such a study?

A. Yes, I have made such a study now.

Q. Have you prepared an exhibit showing the results of such study?

[1408] A. I have.

Mr. HANKIN. If your Honor please, I ask that this exhibit be marked No. 54, I believe, for identification.

* * * * *

By Mr. HANKIN:

Q. Will you please explain this exhibit?

A. I would like to say, first, that I lacked some of the essential elements in this study, in that I did not have the breakdown of the cost of construction which would permit me to determine the average life of the project. However, I used the same 58 years as the company used, as shown on Exhibit 15. I believe that is on the conservative side in this case, because with the canal constituting a large part of the investment the average life of this project would probably be longer than the average life of the project as proposed by the company.

The exhibit shows the dependable capacity and the energy of both of the projects, Plan D in Exhibit 11, and the project in House Document 650. It shows the construction costs, the interest during construction, the total investment, the interest, the amortization charge, the operation and maintenance charge as estimated by the Corps of Engineers, the total yearly costs. The value of the plant is estimated on the basis of the unit [1409] values given by the Corps of Engineers in Exhibit 11. It shows the excess of benefits over costs and the ratio of benefit to cost for both projects.

Q. What are the ratios of benefit to cost for the two projects?

A. The ratio for Plan D is 2.15; for the project as in House Document 650, 2.29.

Q. Mr. Wigglesworth, using the same basis of benefit, is it possible for the same project to have a benefit ratio of 2.15 and 2.29?

A. No, it isn't.

Q. What is the significance of the difference?

A. This is one additional point that shows the difference between the two projects.

Q. In view of this exhibit, would you want to modify your statement that the applicant's testimony on page 95 of the transcript was incorrect?

A. Only to the extent of saying that the statement was incorrect on two grounds, that the projects are not the same and that both projects are economically feasible.

* * * * *

Re-cross-examination by Mr. GATCHELL:

Q. How long did it take you to make this study you are [1410] presenting in Exhibit 54?

A. I think it took me something like an hour to make those computations.

Q. Would you regard that as an adequate study in order to determine the economic feasibility of either of these proposals?

A. Yes, I believe that is an adequate study, considering the information which I had available, which presumably was based on careful study.

Q. That is, taking the evidence that you have referred to and assuming that to be correct this study would be adequate in your opinion to determine the economic feasibility of these two proposals?

A. I believe that is a correct statement.

Q. As I look at this, it says on the third line of the exhibit that it is under government financing.

A. Yes.

Q. You have used an interest rate of two percent?

A. That is correct.

Q. You get that interest rate from where?

A. That is the interest rate which we have recently been considering in the department as applicable to these projects, for the reason that according to the best information we have at the present time that is the cost of money to the government.

[1411] Q. And you presented in Exhibit 49 your idea of the best evidence you have as to the cost of money to the United States? That is the letter from the Treasury Department to Mr. Raver, Exhibit 49?

A. We have had some information more recent than that which shows the average cost of money which at the time that information was put out was still below 2 percent.

Q. Was that for long-term financing or short-term?

A. That was the average rate for negotiable securities.

Q. Well, that includes short-term as well as long-term financing?

A. It does.

Q. And you have accepted that rate as suitable for your purposes?

A. That is correct.

Q. Have you made any study of the economic feasibility of either Plan D as set out in Exhibit 11, or the Roanoke Rapids project, as proposed in House Document 650 under private financing?

A. I have not.

Q. Do either one of these plans propose a project which would be constructed, so far as the physical features are concerned, in a manner similar to that proposed by the applicant in Project 2009?

* * * * *

[1412] The WITNESS. Both of these plans are for a project different in plan than the project as proposed by the applicant.

By Mr. GATCHELL:

Q. Certainly. Now, have you made a similar study with respect to the project proposed in the application for the Project 2009, that would be similar to the study shown on Exhibit 54 for government financing?

A. I have not, but I think Mr. Hamilton presented some figures on that.

Q. I am just asking whether you have made such a study.

A. No.

Q. Have you made a study of that proposal for Project 2009 under private financing?

A. No, I have not.

* * * * *

[1413] By Mr. MOORE:

Q. Are we to understand, Mr. Wigglesworth, that the figures as to average energy kwh shown on Plan D and under the Roanoke Rapids House Document 650 plan, are the figures furnished you by Mr. Coltrin to which you referred in your testimony yesterday afternoon and which you said you would furnish today?

A. The energy figures for Plan D came out of Exhibit 11. The dependable capacity figures were given to me by Mr. Coltrin for the plan in House Document 650.

Q. And that is what you undertook yesterday afternoon to have available for us today? We are now talking about the same thing, are we?

A. The figures which Mr. Coltrin had previously given to me I was unable to locate, so I called up Mr. Coltrin by phone and got these figures from him again last night.

* * * * *

[1415] Q. Now, if you had used instead of a two percent interest rate here, three percent, did you make any computations as to the results that would follow on this statement?

A. I did not.

Q. You referred to the fact that in addition to this information contained in Exhibit 49 with respect to interest rates, you had obtained some further information. Will you just tell us the source of that information and what it is?

A. There was a letter, I believe it was signed by the Secretary of the Treasury, addressed to the Tennessee Valley [1416] Authority, in regard to the applicable rate of interest of the TVA bonds held by the Treasury, in which it was stated that the rate of interest should be something slightly less than two percent.

Q. Have you a copy of that letter available?

A. That has not been introduced.

Q. Well, is it available, a copy of it? You used it, apparently.

A. Yes, we have a copy of it at the office.

Q. What is the date of the letter?

A. The date of the letter, as I recall, is about July, 1948.

* * * * *

By Mr. COHN:

Q. Mr. Wigglesworth, did you make any investigation of the physical feasibility of the project in House Document No. 650 for Roanoke Rapids?

A. I did not.

Q. You have no knowledge as to whether or not that project is or is not physically feasible?

A. I only know what I have seen in the reports.

[1417] Q. Are you referring to any reports other than those in the record in this case?

A. I believe all of the reports have been introduced into the record.

Q. You indicated that certain of the figures on the document marked Exhibit No. 54 had their basis. in your conversation with Mr. Coltrin last evening, is that right?

A. That is correct, and I asked him for the same figures which he had previously given me.

Q. Have you made any independent check on the accuracy of those figures?

A. No, I haven't made anything sufficiently accurate of my own that I could say these figures are accurate. I made some rough computations which

generally bear out these figures, but they would not go to the exact accuracy of the figures.

Q. You are not willing to adopt these figures as your own?

A. In making computations in which the average energy and the dependable capacity are required, I would use these unless I had some reason to believe that they were wrong, and I do not have that reason.

Q. You would use them on the basis of the information given you by Mr. Coltrin?

A. That is correct.

* * * * *

[1418] By Mr. COHN:

Q. Mr. Wigglesworth, do you have Exhibit 45 before you?

A. Yes, I do.

Q. I notice that in Exhibit 45 the annual charges given for Plan D, Exhibit 11, are in the amount of $4,799,000, is that right?

A. That is the annual charge as taken from Exhibit 11.

Q. You will notice that the document marked Exhibit 54, for identification, under Plan D, Exhibit 11, the total yearly costs is given as $1,739,000. Is that right?

A. That is correct.

Q. Would you tell me what causes the variances in those two figures? I take it they are intended to represent the same item, are they not?

* * * * *

The WITNESS. It is the difference between private financ[1419]ing and government financing, as I understand it.

Mr. COHN. That is all, Mr. Examiner.

CHIEF PRESIDING EXAMINER. Carolina Power and Light Company?

Mr. ROUSE. No questions, sir.

CHIEF PRESIDING EXAMINER. Do you have some questions, Mr. Hankin?

Mr. HANKIN. No, sir. I now offer Exhibit 54 in evidence.

CHIEF PRESIDING EXAMINER. It will be received.

(The document above referred to was received as exhibit No. 54.)

CHIEF PRESIDING EXAMINER. You may now be excused, Mr. Wigglesworth, and thank you very much.

(Witness excused.)

TESTIMONY OF MR. STRANDBERG

FURTHER CROSS-EXAMINATION

* * * * * *

[1946] Q. If you will turn to page 3 of this report you will find in paragraph 8 a statement: "In the Flood Control Act of 1944, Public Law 534, 78th Congress, 2d Session, Congress approved the comprehensive plan and authorized the construction of two reservoirs, the Buggs Island Reservoir on Roanoke River and the Philpott Reservoir on Smith River." What do you understand by the word "comprehensive"?

* * * * * *

[1947] The WITNESS. My understanding of the term "comprehensive plan" is that it includes a plan which makes as complete a development of a river as is found to be economically feasible.

By Mr. HANKIN:

Q. And so the term "a comprehensive plan of development of the river basin" I take it you would say would mean an all-inclusive, all-embracive plan, is that correct?

A. As far as the plan is concerned, I would think that [1948] is correct.

Q. And what was the meaning of the term "comprehensive plan" as applied in House Document 650? What did it embrace?

* * * * *

Q. What, to your understanding, was meant by the "comprehensive plan of development" of the Roanoke River Basin, as used in House Document 650?

A. My understanding of a comprehensive development is that it means a completion of the sum of different parts which, when added together, develop the resources as completely as economically feasible.

Q. Specifically, with reference to House Document 650, could you enumerate the projects which would constitute that comprehensive plan of development?

* * * * *

[1949] The WITNESS. As far as my engineering study was concerned, it was limited to a study of the economics of a development at Roanoke Rapids and a development at Gaston. Included in that study was a limited amount of engineering study as to the

possible effect of the Buggs Island development on these two proposed projects, and my study was so limited. That is all I was requested to do.

Mr. HANKIN. Mr. Reporter, will you please read the question, and I am going to ask the witness to answer that question.

* * * * *

[1950] The WITNESS. Without reference to House Document 650, I could not.

By Mr. HANKIN:

Q. I am handing you a copy of House Document 650. Perhaps that will refresh your recollection.

A. As I read the profile of the river in this, and starting at the downstream end, it is my understanding that this document included reference to Roanoke Rapids dam site, Gaston dam site, Buggs Island dam site, Randolph Dam site, McKeever dam site, Melrose dam site, Tabor dam site, Leesville dam site, Smith Mountain dam site on the main river. I believe Philpott is on one of the branch streams, and I do not remember or do not readily find the eleventh one, I believe it is, but I find here the Stewart dam site.

Q. That makes altogether how many projects?

A. I believe that makes 11 referred to by this document.

Q. Will you please turn to page 13, paragraph 37, of Exhibit 11? I invite your attention to the heading of paragraph 37: "Plan as proposed in House Document 650 (Plan D)." Do you understand by

that that the plan proposed in House Document 650, which you referred to as the Roanoke Rapids project, and Plan D are supposed to be identical?

A. Not identical, but that they were essentially a similar project, and that it was my understanding Plan D in-[1951]cluded revisions which the Army Engineers wished to consider in their comparison.

Q. Now, will you please turn to page 18, which is designated as Table 5, and will you state whether the data given for Plan D assumed a private or government development?

A. It is my understanding that this is based on private development.

Q. Now, will you turn to House Document 650 and state whether the Roanoke Rapids project in that document assumes a private development?

A. It is my understanding that House Document 650 assumes federal development.

Q. When you stated on page 95 of the transcript that according to this report the Roanoke Rapids project in House Document 650 was infeasible and uneconomical, did you mean that the plan in House Document 650 under government development would be infeasible or uneconomical, or did you mean that Plan D, under private development would be infeasible or uneconomical?

A. Under private development.

Q. Please make your statement complete. I asked whether you meant that Plan D under private development was uneconomical.

A. I meant under private development it would be uneconomical.

Q. Well, which one? The one in House Document 650, or the one in Exhibit 11?

[1952] A. I meant that the data in Plan D, when properly related as an engineer would do, according to my understanding, the data would show that the plan in House Document 650 without the changes to Plan D, would be uneconomical for private development.

Q. You stated just now that the plan in House Document 650 assumed a federal development, isn't that so?

A. That is so.

Q. So that what you must have had in mind when you said that according to Exhibit 11 the Roanoke Rapids Project in House Document 650 was infeasible and uneconomical, you couldn't have meant the project in House Document 650 because that is not a private development?

A. My understanding that the project might be the same, no matter who is making the development, is when you limit it to the project. Just because somebody else is building does not necessarily change the project.

Q. I see. What you meant, then, was this: That the Roanoke Rapids project, which is found in House Document 650, if lifted out of the context of that docu-

ment and turned into a private development, would be uneconomic or unfeasible, is that correct?

A. I mean the project described in House Document 650 would be uneconomical for private development.

* * * * *

CROSS-EXAMINATION

[283] By Mr. HANKIN:

Q. Your answer, of course, would be the same as to the Gaston project at mile 145 on the Roanoke River? That is, that is one of the projects included in the comprehensive plan of development?

A. It is included in House Document 650.

Q. If a license were granted to the applicant to construct the project proposed in the application as amended, would it affect the project at Gaston included in House Document 650?

A. It would interfere or backwater upon any development at Old Gaston, as included in House Document 650.

Q. Would that lower the energy output of the Gaston project?

A. It would lower the energy and capacity available from any development at the Old Gaston site, included in House Document 650.

Q. And would that raise the unit cost of the energy produced at Gaston?

A. If a development were made at the Old Gaston site included in House Document 650, yes.

* * * * *

[300] Q. * * * Now, I would like to know this: Assuming that the Gaston project as proposed in House Document 650 were constructed as specified

therein, what would be the effect of the Roanoke Rapids project as proposed in the amended application on the Gaston project be, in terms of the total energy?

A. It would increase the backwater on the Gaston project and it would depend some on the load factor and the amount of drawdown utilized at Site B as to just exactly how many kilowatt-hours would be lost at Gaston. 132 backs up approximately five feet on the Old Gaston site. If the reservoir is drawn down one foot, it only backs up four. It depends on how the pondage at site B is used to determine the exact effect.

Q. If it backs up five feet, it would mean a loss in total energy, would it not?

A. At Old Gaston?

Q. At Old Gaston.

A. That is correct.

Q. Can you tell us how much of a loss that would be?

A. I believe that the difference in output on upstream and downstream Site A is probably a fair measure of that amount of energy, and that is a difference of 22 million kilowatt-hours.

[301] Q. Can you also give us an estimate of the difference in the power available 90 percent of the time?

A. The difference in installed capacity is probably a fair measure of the same thing. It is stepped down from 85,000 kilowatts to 79,000 kilowatts. That is a measure of the capacity on the Virginia Electric Company load.

As far as the power available 90 percent of the time, that would be materially less than that difference, because the power available 90 percent of the time is undoubtedly much smaller than the installed capacity.

Q. And how about the dependable capacity, would that be affected?

A. It depends on the load that you are going to apply it to. To the Virginia Electric and Power Company load the difference is the difference in installed capacity. It depends on the load factor that you have to apply the plant to.

Q. How about the dependable capacity of the plant by itself, without reference to the system to which you are connected?

A. I know of no way of saying what the dependable capacity of a plant is unless I know the load it is to be applied to.

Q. How about the reduction in the annual benefits of that project? How much would that be?

* * * * * *

[302] The WITNESS. You are assuming that with Site B developed you are going to build Old Gaston at the downstream site, in spite of the backwater?

By Mr. HANKIN:

Q. Yes, or I am assuming that if the effect on the site as included in House Document 650, is in contemplation, then perhaps the construction of your project is not feasible.

* * * * *

The WITNESS. My estimates show that the combination as now proposed is more economical and I would say, therefore, more feasible as a combined proposition.

By Mr. HANKIN:

Q. That is not the question I asked you. I am saying this: Here the Army Engineers have proposed a project at Gaston. You come along and you want to construct a project at Roanoke Rapids which you stated would affect the proposed project at Gaston to the extent of taking five feet off the head, is that right?

A. During full pond time, yes.

Q. I am asking you what that would mean in terms of the annual benefits of that Gaston project.

* * * * *

[303] The WITNESS. I have not computed what the economics of downstream Site A would be if Site B were built to elevation 132, as I have assumed that since there is a better site which fits into an over-all program upstream from that site, on which there would be no backwater, that no one would build a development at downstream Site A if Site B were built to 132.

By Mr. HANKIN:

Q. Now, will you assume that the project will be built there and can you then make a computation of the loss in annual benefits?

A. I could take the costs at downstream Site A and by making an assumption of how the pond at Site B would be operated, I could compute the difference

in the economy of construction of such a site. That would be perfectly possible, although I do not see how it could enter into the picture, considering——

CHIEF PRESIDING EXAMINER. Now, Mr. Witness, it will not be proper for you to argue on the witness stand. The fact is you made no such computation as that, is that correct?

[304] The WITNESS. That is correct.

By Mr. HANKIN:

Q. And I asked whether you could make such a computation.

A. I stated that it would be perfectly possible to make such a computation.

Q. Now, will you make such a computation?

* * * * * *

[305] Mr. MOORE. Well, sir, we will try to give you that answer after lunch.

By Mr. HANKIN:

Q. Now, Mr. Strandberg, assuming that the Gaston project as proposed in House Document 650 were moved to upstream Site A, do you agree with the statement on page 10, paragraph 31, of Exhibit 11——

A. Which report is that?

Q. That is Exhibit 11.

A. Is that the Army's report of February 1949?

Q. Yes, page 10, paragraph 31. Will you read that?

A. Which number is that?

[306] Q. Paragraph 31.

A. "The Virginia Electric and Power Company has informed this office of a new location for the

Gaston Dam. This new site is situated 9,600 feet upstream from the former site. Tailwater at this new location is about 137 for a discharge of 15,000 c. f. s. As a result, there will be a reduction of about 10 feet in head at the Gaston project. Such a condition would tend to make this project less attractive than as planned in House Document 650. Tailrace excavation below the new Gaston site might permit the recovery of a portion of the head lost. Such an investigation has not been made in connection with this report."

Q. Do you agree with that statement as to the effect on the Gaston project?

A. As far as the upstream site A development, included in the report to the Virginia Electric and Power Company, a tailrace was included, so that there would be no over-all loss in head in the development of the two sites. If a development were made at upstream Site A and no tailrace were excavated there would be a material loss in head.

Q. Would there be a loss of about ten feet?

A. I haven't computed that. On the basis of the statement right here, between elevation 127 and 137 there would be.

Q. A difference of ten feet. What would that difference [307] of ten feet mean in terms of total energy, power available 90 percent of the time, installed capacity, dependable capacity, if different from installed capacity, and the total yearly benefits?

A. That ten feet would be about 10/74ths of the head.

Q. Can you give us that information in terms of actual figures, rather than in terms of ratios?

* * * * * *

The WITNESS. I do not have those figures, and I have never made such a computation.

By Mr. HANKIN:

Q. Can you compute those figures?

A. They are possible to compute.

Q. Will you do it?

* * * * *

Mr. MOORE. We will try to get it for you after lunch. * * *

By Mr. HANKIN:

Q. Is it not true, Mr. Strandberg, that if the Gaston project is moved while there is an increase of five feet in head [308] at Roanoke Rapids, there is a loss of ten feet in head at Gaston, which means there is a net loss of five feet of head in your plan of development?

A. No, sir.

Q. How do you arrive at that?

A. If we did not excavate a tailrace at Site A, there would be a loss of ten feet. But just as, by excavating a tailrace, we gain possibly 15 to 18 feet of head, by excavating a proper tailrace at Site A, you do not lose more than the backwater from the increased height of Site B.

Q. Suppose there is no tailrace excavated at Site A?

A. You are asking me to suppose.

Q. After all, a tailrace is not included in the plan of development at Gaston in House Document 650, is it?

A. I have never seen any hydro development where you did not excavate a proper tailrace. And for upstream Site A, I am satisfied that a tailrace is required to make it fit into a proper development of the river under federal law.

Q. How much would that tailrace cost if it were to destroy that net loss of five feet?

A. I do not have the detailed figures for it, but it was part of our over-all cost of Site A.

Q. Can you furnish that information?

A. That is getting down to detailed figures. I may be able to pick that part out of my estimates.

[309] Q. You see, the object of all these questions is to find out just what is the actual effect of your project, of your proposed project, on the project at Gaston.

A. Yes, sir, and my over-all sheet here shows exactly that.

Q. What we want are the actual figures, so that we may be able to talk about them in plain terms, rather than metaphysical or philosophical terms.

When you compare the benefit ratios of upstream Site A and downstream Site B, with an elevation of 132, which, I take it, is the project that is the subject of the amended application, is that right?

A. In my comparison I did not have as much capacity in there as there is now at this site, because we did not have in that comparison the long tailrace which is now a part of the project. So that the capac-

ities used in the comparison were somewhat less. They were the capacities that would correspond to Site B without the long tailrace in either case.

Q. And with the long tailrace, what would the benefit ratio be of downstream project B, with a headwater elevation of 132?

A. I did not quite get your question.

Q. I said: I understood you to say that your benefit ratio of 1.179 for the downstream B elevation of 132, was without the tailrace, is that correct?

A. That is correct.

[310] Q. Now, with the tailrace, what would it be?

A. The estimates which were used for the 1.179 were made in April 1948, for that report. I have the figures as of the project estimate, including the tailrace, and the ratio is 1.115—including the tailrace.

Q. You mean the ratio is less?

A. The ratio is less. The tailrace excavation is not quite as economical as the average of the rest of the project.

Q. So that the benefit to the feasibility of the project is reduced from a benefit ratio of 1.179 to 1.115, is that correct?

A. As of the estimates in April 1948, for the 1.179, adding the tailrace and adjusting to prices as of now, the ratio is reduced to 1.115.

Q. And you say you have a tabulation showing that benefit ratio?

A. That is on this same sheet.

Q. On the same sheet that you showed us?

A. Yes, sir.

Q. Now, in computing these benefit ratios of both Site A—we will take the upstream Site A, and the downstream Site B, with an elevation of 132—did you make that computation in the light of the existence and operation of the Buggs Island project?

A. Yes, sir.

[311] Q. What would be the benefit cost ratios of these projects if Buggs Island were not in existence?

A. I did not compute that. The capacity values would be the same. The energy values would be somewhat reduced, but I have not made the computation.

Q. Can you make those computations?

A. They could be made. It would require some time to take new stream flow records without regulation.

Mr. MOORE. We are not going to do that, I will assure you.

TESTIMONY OF MR. HAMILTON

DIRECT EXAMINATION

[980] Q. Assuming that Roanoke Rapids were constructed by the applicant in accordance with the amended application, would that project affect the Gaston project as planned in House Document 650?

A. Yes, it would reduce the head by five feet.

Q. What would that mean in terms of capacity, energy output, and unit cost per kilowatt hour?

A. It would reduce the capacity and the energy by seven and one-tenth percent and would increase the cost per kilowatt hour in inverse proportion to the output that would result from operating under five foot less head.

* * * * * *

[981] Q. Suppose the Gaston project were moved upstream a distance of some 9,400 feet, what would be the effect on the Gaston project?

A. There would be very little loss in pondage, and the five feet of head could possibly be gained by tailrace excavation. It has been testified that the excavation would cost approximately $740,000. There is another factor, however, that enters into this change in plan, and that is the United States planned on developing Gaston through the installation of 54,000 kw. of equipment.

This equipment would not be large enough to permit all the water required in Roanoke Rapids project

to develop power without wasting water unless additional or larger equipment was installed. This equipment, in order to pass 18,035 second-feet would have to be increased by 36,000 kilowatts. If the estimates used in the Engineers 1943 report of the cost per kilowatt of the power plant, as being $89, then the total cost [982] of the added generating capacity would amount to $3,204,000.

[1068]. Cross-examination by Mr. MOORE:

* * * * *

Q. I understand you testified on that page in reply to the question beginning on line 9, page 981——

A. Yes, sir.

Q. That 36,000 kilowatts additional capacity costing an additional $3,204,000 would have to be installed at the upstream Gaston site in order to avoid wasting water at the upstream Gaston site. If that is what you there intended to say, will you state now why that is true?

A. In order to pass the same amount of water through [1069] the generators and water wheels that would be passed through the water wheels at Roanoke Rapids.

Q. You assume, then, that it is necessary to be done that way?

A. Yes, sir.

Q. What basis have you for that assumption?

A. The projects are approximately the same head. Consequently, if 18,050 second-feet should be passed, it should pass through the turbines at Gaston.

Q. Is that the only ground on which you wish to suggest the answer that you have given is based?

A. That is all.

Q. You state there as to the 54,000 kilowatt installation planned for Gaston, the following: "This equipment, in order to pass 18,035 second-feet would have to be increased by 36,000 kilowatts."

A. Yes.

Q. Why is it necessary, Mr. Hamilton, to pass 18,035 second-feet at Gaston in order to operate the proposed Roanoke Rapids project in the manner that is here proposed?

A. If the plant remained as it was in the original plan, only 9,000 second-feet could be passed.

Q. You mean at Gaston?

A. At Gaston. It is planned to install around 108,000 kilowatts at Buggs Island, which has to operate on about a [1070]72-foot head during December in the low year. There was also provision made to bring the Buggs Island plant up to around 200,000 kilowatts, so that provision should be made at the Gaston plant, so that water would not be wasted.

Q. Were you referring to Gaston in connection with that 9,000 you just mentioned, or were you referring to Buggs Island?

A. I was referring to Buggs Island.

Q. You said "Gaston" again.

A. No, Gaston would only pass 9,000 second-feet.

Q. Which is right, do you intend the 9,000 second-feet to refer to Gaston, the amount of water that would be passed at Gaston, or are you referring to Buggs Island?

A. The Gaston plant will pass 9,000 second-feet.

Q. Under what conditions?

A. Under conditions of 73 foot of head and development of about 90,000 kilowatts.

Q. I want to be sure that I understand you in that connection. Do you assume that the Gaston and Roanoke Rapids plants must necessarily be operating on the same load factor, in connection with the testimony you have been giving, and that they need the same stream flow at the same time continuously?

A. What I am trying to say is that if Roanoke Rapids is built for 18,050 second-feet, that unless the plant next above is built for passing that same amount of water, then there will be a wastage of water when 18,050 second-feet is **[1071]** being passed.

Q. It is necessary to have 18,035 second-feet of water passing through the plant at upstream Gaston site in order to have that amount of water passing through the proposed Roanoke Rapids plant from the Roanoke Rapids pond, at the time that Roanoke Rapids is operating at capacity? Is that your view?

A. No. Above Roanoke Rapids we have what might be termed the pondage. The purpose of that pondage is not storage. However, it is supposed to take care of fluctuations in the stream that is fed in from above, and also to take care of load rejection, so that water is not wasted, and to permit the plant to pick up load without loss of head. There is a material difference between pondage and storage. If you assume you are going to operate Roanoke Rapids pondage for storage, then you would have to operate it in an entirely different way than you would for pondage, because you have to draw your water down and be prepared to grab water as it comes

in. There is an entirely different function between pondage and the storage situation.

Q. Are we to understand, then, that in the answers you have just given you have disregarded the effect of the Roanoke Rapids pondage?

A. No.

* * * * *

[1072] Q. When you assumed that the same quantity of water was required to be discharging 18,035 second-feet, what effect have you given to that pondage?

A. In some periods when the water was being discharged at a lesser rate, or at a greater rate from Buggs Island, the pondage would be effective. In periods of good water, Buggs Island can be discharging 18,035 second-feet and the plant immediately below it should be able to pick up that amount.

Q. I was talking about the release from Gaston. You have gone back to talking about Buggs Island. What I am now seeking from you is the answer to my question as to what effect have you given the pondage at Roanoke Rapids in connection with your testimony with respect to the discharge required [1073] at upper Gaston.

A. I have given very little weight to the variation discharge from Gaston because the discharge from Buggs Island in reality determines the amount of water that is passing downstream. It is feasible to grab some water or draw down the Gaston storage somewhat. At Roanoke Rapids it is also feasible to draw down the pondage and grab some water from Buggs Island when it would be in excess of 18,050

second-feet, and when there is excess water at Roanoke Rapids the discharge from Buggs Island could be less.

However, the pondage at Roanoke Rapids is only 1/100th of the storage in Buggs Island and there are only 4,900 acre-feet. Now, if we figure we have a foot draw down we have 2,500 second-feet per day, so we can depend on about that much to take care of the variation in stream flow from Buggs Island.

Q. You said you had given very little weight to that pondage in connection with the discharge required at upper Gaston. Isn't it a fact that you have not given the pondage any identifiable weight?

A. You mean from Gaston up?

Q. Yes, that is right. We are speaking of Gaston discharge.

A. That is correct.

Q. It is so small you cannot find it in your figures, isn't it?

[1074] A. No.

Q. I say, so far as any weight you have given it.

A. It is a question of how you are going to operate Gaston. Gaston should be operated, if the three projects are going to be operated together, so there will not be any delay in getting the water out of storage from Buggs Island to Roanoke Rapids. If we pull down the storage, or the pondage at Gaston and then draw water from Buggs Island, if we only have a 9,000 second-feet opening in Gaston, then Roanoke Rapids will not be able to operate at 18,050 second-feet unless it has sufficient water in its pondage to carry over.

Q. Now, in connection with that point, is it not true that water can pass through the plant at upstream Gaston site for a period of time at a lesser rate than 18,035 cubic feet per second, but filling the pond at Roanoke Rapids at thereupon permit operation at Roanoke Rapids with greater amounts of water passing through the plant at Roanoke Rapids on peak loads? Isn't that true?

A. That would be true, but that would be, in my mind, extremely poor engineering. I don't think the Federal Power Commission would permit it, and I don't think the Army Engineers would permit it, to have a plant of one-half the water capacity immediately upstream from another one.

Q. That is your view, anyway?

A. That is my opinion.

[1075] Q. How many second-feet do you figure were included in House Document 650 as passing Gaston site in order to develop 54,000 kilowatts? In this connection, if you will look at pages 61 and 62 of House Document 650, I think you can readily tell us the answer to that question.

A. Where is that?

Q. 61 and 62. My question is, how many second-feet do you figure were included in House Document 650 as passing Gaston in order to develop 54,000 kilowatts there involved?

A. It gives the average flow of 8,500 second-feet, 8,520 second-feet.

Q. In other words, your best judgment is that 8,500 second-feet is the answer to my question, isn't it?

A. If you use the same 5.32 that was used in the

Charles T. Main report, and divide it into 91,000 kilowatts you will arrive at the second-feet that would pass through the wheels at Gaston.

Q. Mr. Hamilton, there is not any need for the second-feet required to operate at capacity at the two sites to be the same for satisfactory operation, is there?

A. They should be permitted to operate so that water is not wasted at one plant or the other, to satisfy its operating requirements.

Q. I don't think that is an answer to my question. I want to get a specific answer, yes or no, to that question, and [1076] then you may make any explanation to that you want to make. My question was whether or not it is your contention that there is need for the second-feet required to operate at capacity at the two sites to be the same, for satisfactory operations. We are here talking about Roanoke Rapids and Gaston. I just wanted to be perfectly clear as to whether it is your contention that there must be the second-feet at both sites, the same for satisfactory operation.

A. If the Roanoke Rapids project is to be built for 96,000 kilowatts, then the Gaston project should be built for the same amount.

Q. Do you think that answers my question?

A. Yes, sir.

Q. That is the best answer you can give to my question?

A. I think that is a pretty good answer.

Q. All right.

Mr. Hamilton, the condition you have stated would be true, would it not, only if it were necessary that

both plants operate precisely the same number of hours each day and at the same load factor, isn't that true?

* * * * *

[1077] The WITNESS. Theoretically that would be true. As a practical matter we would want to have both plants able to handle the same amount of water.

By Mr. MOORE:

Q. At any rate, in your testimony, you have dealt with it on the theoretical basis, have you not?

A. I have dealt with it on a practical basis.

* * * * *

[1079] By Mr. MOORE:

Q. What does the matter of the size of equipment discussed in your answer on page 981, Mr. Hamilton, have to do with the question which was asked you, that is, as to what would be the effect on the Gaston project from moving it upstream 94,000 feet?

A. Well, I could have answered the Gaston project would operate very inefficiently. The point was to get some evaluation of the effect.

Q. That is on the same assumption that you would need to pass the 18,000 cubic feet per second through it, is it not?

A. No, it is on the same assumption that it would be extremely poor engineering to put one plant immediately above the other with 9,000 second-feet and one below for 18,000 second-feet, and I don't believe your engineers would recommend [1080] that.

* * * * *

[1081] Q. That is all based on the idea that you would need to operate both plants precisely on the same

number of hours per day and at the same load factor, is it not?

A. No, sir.

Q. I don't understand yet what your evidence is as to what the additional equipment that you testified about, has to do with moving Gaston upstream 9,400 feet.

* * * * *

[1082] CHIEF PRESIDING EXAMINER. Suppose we leave it to the witness. What do you wish to say in answer to that, Mr. Hamilton, if anything, or have you made all the answer that you feel you could give?

The WITNESS. I think it has been answered so that engineers will understand. They understand it fully.

* * * * *

By Mr. MOORE:

Q. I want to make clear to you that what I am talking about is just the one point, namely, what does this matter of size of equipment that you have testified would have to be changed, have to do with just the one fact of moving Gaston upstream by 9,400 feet?

* * * * *

[1083] The WITNESS. My recollection is that the original project at Roanoke Rapids was not designed to take 18,050 second-feet.

* * * * *

Q. Do you intend to testify here that increase in capacity at Roanoke Rapids by installation of additional generator units would compel the United States in developing Gaston to spend $3,000,000 more for it, in order to add generating capacity, in order to add

36,000 kw. generating capacity in order to avoid wasting water, Mr. Hamilton? Do you really intend to testify to that?

* * * * *

The WITNESS. I have testified to it.

* * * * *

Q. Will you now turn to your testimony in the first sentence of the last paragraph on page 981?

A. "This equipment would not be large enough"?

[1084] Mr. MOORE. That is right. The quotation there, "This equipment would not be large enough to permit all the water required in Roanoke Rapids project to develop power without wasting water unless additional or larger equipment was installed."

In view of these questions I have asked you this morning, do you wish to in any way modify that statement, or not?

* * * * *

The WITNESS. No.

CHIEF PRESIDING EXAMINER. Do you wish to modify the answer you made heretofore?

The WITNESS. No.

By Mr. MOORE:

Q. Have you any further statement to make in support of it or in explanation of it, in light of the questions I have asked you this morning?

A. It has been testified that the plan has been to run the Roanoke Rapids project 16 hours a day for five days a week. If it is planned to run that project over 16 hours and take 18,000 second-feet, then that much water has to come down so that you have de-

pendable capacity. Then if the project immediately up the river is not built for 18,000 second-feet, [1085] there will be a wastage of water at that project.

Q. Are we to understand that all of your testimony this morning on this subject of the effect of them moving the site up to upper Gaston is predicated on the assumption that you just mentioned a moment ago in your last answer, namely, that you are assuming throughout your testimony that the Roanoke Rapids plant shall be operating at full capacity of 91,000 kw. 16 hours a day?

A. No, sir.

* * * * *

TESTIMONY OF MR. SUNDA

DIRECT EXAMINATION

[587] Q. * * * In your opinion, is it material as to whether the Roanoke Rapids pool is established at elevation 127 or elevation 132, at this time?

A. Prior to the establishment of the pool elevation 132 at Roanoke Rapids the applicant should be required to investigate the feasibility of the relocated Gaston site. As soon as it is determined which Gaston dam site is best and economical, the Roanoke Rapids pool can be definitely established.

The Roanoke Rapids project at elevation 127 or elevation 132 is immaterial insofar as capacity and energy is concerned because any reduction of head at the proposed Gaston project could be picked up at the Roanoke Rapids project and vice versa.

* * * * *

CROSS-EXAMINATION

* * * * *

[739] Q. On page 587 of the transcript you testified that it would make no difference whether Roanoke Rapids project was at elevation 127 or 132 insofar as its effects on Gaston is concerned, because any reduction in the head at Gaston could be picked up by Roanoke Rapids, and vice versa. I take it you mean it is the same as taking money from one pocket and putting it into another.

A. That is correct.

Q. But, Mr. Sunda, when the money is taken from the pocket [740] of one person and put in the pocket of another person, it makes a great deal of difference, does it not?

A. There is no assumption made on the basis here.

Q. What is your assumption?

A. As I stated, the amount of energy—there is no matter of funds considered; it is a question of energy only.

Q. Do you mean by that it makes no difference whether Gaston project is owned and operated by the same person as the Roanoke Rapids project?

A. The cost——

CHIEF PRESIDING EXAMINER. Do you mean that, or not? The question is "Do you mean that"?

The WITNESS. I can't understand the question the way it is asked.

CHIEF PRESIDING EXAMINER. Very well. Then, of course, you do not know whether you meant it or not.

By Mr. HANKIN:

Q. Have you assumed for the purposes of this question that Gaston is going to be turned over to the applicant?

A. We made no assumption as to who would build Gaston. We, strictly from an engineering standpoint, determined what energy would be had from the two projects and whether any would be lost by shifting the five-foot head from one point to another.

Q. In other words, you assumed that if the United States [741] constructs and operates Gaston, and the applicant constructs and operates Roanoke Rapids, that the loss in energy or capacity at Gaston, which is picked up by Roanoke Rapids, would make no difference. Is that correct?

A. The energy and capacity would make no difference, no.

Q. The energy and capacity would make no difference? Do you mean by that it would make no difference to the owner and operator of Gaston, or do you mean it would make no difference because whatever is lost by the owner of Gaston will be picked up by the owner of Roanoke Rapids?

A. That is correct.

Q. What is correct? Which one is correct?

A. Anything lost at Gaston would be picked up at Roanoke Rapids.

Q. Anything lost, then, by the United States, will be picked up by the applicant. Is that correct?

A. I made no assumption as to who would develop the project.

* * * * *

[742] By Mr. HANKIN:

Q. What do you mean by "vice versa"?

A. If the pool level at Roanoke Rapids is established at 127, then the Gaston would gain 5 feet. If the project at Roanoke Rapids is at elevation 132, then the Gaston would lose five feet.

Q. You said any reduction in the head at Gaston would be picked up by Roanoke Rapids, and vice versa. Just how would Gaston pick up any energy or capacity from Roanoke Rapids?

A. If the pool at Roanoke was maintained at 127, then Gaston would gain five feet of head. In other words, the gain would be back to Gaston.

* * * * *

Testimony of Mr. Hamilton

Direct Examination

[982] Q. Will you state what, if any, would be the effect of the proposed Roanoke Rapids project on Buggs Island?

A. It would have no physical effect, but a great economic effect.

Q. What would be the nature of this economic effect?

A. In the resulting lower cost of energy if the Government operated both Buggs Island and Roanoke Rapids.

Q. What do you estimate would be the economic effect?

A. If the government is required to operate Buggs Island as a separate project, the cost of energy from the project is estimated to be 5.10 mills. If Buggs Island and Roanoke Rapids are operated as a combined project, the estimated cost per kilowatt-hour under combined operation would be 4.16 mills.

The difference in cost, therefore, is 0.94 of a mill, and if this cost is multiplied by the total output of 718 million kilowatt-hours it amounts to $674,920.

If the energy from both projects is sold at the Buggs Island rate, under combined operation, of 5.10 mills, then the total saving would amount to $1,063,000.

Q. Would that amount of $1,063,000 be the difference in power benefits to the consuming public?

A. No, the difference to the consuming public would be very much greater.

[983] Q. Why?

A. Because if Roanoke Rapids is operated by the applicant, then the cost of energy from Roanoke Rapids would be far greater than the difference in kilowatt-hour costs mentioned above.

Q. What would be the effect of the proposed project on the comprehensive plan of development contained in House Document 650?

A. If Roanoke Rapids was withdrawn from the plan the benefits outlined above would in great part be lost to the comprehensive plan.

Q. How would that affect the feasibility of the plan?

A. It would reduce the feasibility of the plan from 1.47 to 1.34.

Q. What would that mean in dollars?

A. It would reduce the benefits as set out in the comprehensive plan by $1,481,000.

* * * * * * *

[1094] Cross-examination by Mr. MOORE:

Q. Are we to understand that the 718 million kilowatt-hour figure that you used on page 982 of the transcript is made up of 410 million kilowatt-hours for Buggs Island and 308 million kilowatt-hours for Roanoke Rapids?

A. Yes, sir.

Q. Also, are we to asume that your estimated cost of Roanoke Rapids by itself would be 2.9 mills applicable to that 308 million kilowatt-hours?

A. Yes, sir.

Q. You have on page 982 of the transcript referred to a differential or a difference of 0.94 mills, that being the difference between the 5.1 mills for Buggs Island, and the 4.16 mills for the combined operation of Buggs Island and Roanoke Rapids. Now I ask you: Should not the 0.94 mills be applied only to the figure of 410 million for Buggs Island if we are to determine the effect of the proposed [1095] Roanoke Rapids plant on Buggs Island?

A. If the government is going to sell all of the kilowatt-hours, they would sell all of them at 0.94 less.

* * * * * *

By Mr. MOORE:

Q. Mr. Hamilton, how is the figure of $674,920, appearing on page 982, arrived at?

A. By multiplying 0.94 mills by 718 million kilowatt-hours.

Q. If the cost of the Roanoke Rapids power is 2.9, and that power is thrown into the pool of power of both projects and is sold at 4.16, just how do you figure that there is savings to the consumers with respect to the sale of the Roanoke Rapids power?

* * * * * *

[1096] The WITNESS. My answer is that if we sell 718 million kilowatt-hours at 4.16 mills in lieu of selling 410 million at 5.1 mills, and Buggs Island power, instead of selling it at 2.90, sell it at 4.16, we will have a saving of $674,920.

By Mr. MOORE:

Q. I was asking you about the Roanoke Rapids portion of it—the 308 million kilowatt-hours. How do you compute that there is a savings to consumers by combined operations, insofar as the pool of power in part is made up of the 308 million kilowatt-hours from Roanoke Rapids when the cost of that power is 2.9, and it is sold for 4.16?

* * * * *

[1098] The WITNESS. The answer, I think, is if you operate them separately, one would be at 5.1 and the other, 2.9. If they are operated jointly, then the power from both can be sold for 4.16. Consequently, the public will have only paid 4.16 mills average for the total power rather than 5.1 mills for 410 million, and 2.9 for 308 million kilowatt-hours.

* * * * *

[1099] By Mr. MOORE:

Q. I will put it another way: Applying .94 mills lower cost—that is, the difference between the 5.1 and 4.16—to the 410 million kilowatt-hours from Buggs Island power alone, do we not get by comparison of the 4.16 with the 5.1—looking now just at Buggs Island power alone—a difference of $385,400? You could make that computation, can't you?

A. Yes, that is right.

[1100] Q. By selling Roanoke Rapids power at the higher combination cost; namely, 4.16, when the overall cost of production, you testified, was 2.90, there would be a corresponding loss to consumers purchasing the Roanoke Rapids power in exactly the same amount; namely, $385,400, would there not?

A. There would. That theoretical analysis is misleading, because it is only under Government operation that we could get the 2.90. If it was not operated under Government operation at 2.9, that figure would be many times that.

* * * * *

By Mr. MOORE:

Q. Were you intending, on page 982, Mr. Hamilton, in your discussion of the advantages of combined operation by the Government of both projects, to represent savings to [1101] consumers by such combined operation?

A. Yes, sir.

Q. That is what I understood.

A. That is right.

Q. Now, in that connection, will you tell us how you arrived at the $1,063,000, which you state was the total savings that you said would be in that amount? You used there the words "total savings." Tell us how you arrived at that figure.

A. If the Buggs Island project and Roanoke Rapids were operated separately, we would have a condition where the customers would have to pay 5.1 mills for

energy from Buggs Island. If we multiply 308 million kilowatt-hours by the difference between 5.10 and 2.90, we get 2.2 mills times 380 million kilowatt-hours. If we substract 4.10 from 5.10—4.16 from 5.10—multiply that result by 410 million kilowatt-hours and we add those results together, we get $1,063,000.

* * * * * *

[1102] Q. You have taken the $674,920 figure and you have added to that this figure of $385,400, which was the increase in price at which the Roanoke Rapids power would be sold above cost; namely, 4.16 as compared with 2.9. Now, haven't you added those two figures?

CHIEF PRESIDING EXAMINER. Now, Mr. Hamilton, that whole question is "Did you, or haven't you?"

The WITNESS. No, sir.

By Mr. MOORE:

[1103] Q. Does not the figure $1,063,000 consist of the sum of the two figures $674,920, referred to on page 982, plus $385,400, which you testified a few moments ago was the difference, as to Roanoke Rapids power, between the cost of 2.9 and 4.16?

* * * * * *

The WITNESS. No.

By Mr. MOORE:

Q. It is just an accident that the figure $1,063,000 does happen to be the sum of $674,920 plus $385,400?

* * * * * *

Q. Will you just give us the actual figures, without any discussion—unless you want that discussion—that you used in arriving at $1,063,000, and then I will leave that point?

* * * * *

The WITNESS. If you take the 0.94 and multiply it by [1104] 718,000 kilowatt-hours you get a little different figure than 674,000.

By Mr. MOORE:

Q. $674,920?

A. $674,920.

You will get a somewhat different figure than $674,920, but they will both add up to the figure I said of $1,063,000.

* * * * *

[1105] Q. Mr. Hamilton, will you look at page 983 of the transcript covering your testimony, line 2. Do you see that?

A. Yes, sir.

Q. You there stated: "Because if Roanoke Rapids is operated by the applicant, then the cost of energy from Roanoke Rapids would be far greater than the difference in kilowatt-hour costs mentioned above."

Does your statement that "the cost of energy would be greater than the difference in kilowatt-hour costs mentioned above" refer, first, to the savings in government financing as compared to private financing,

and, secondly, the difference in taxes, or do you have any further differences in mind?

* * * * *

The WITNESS. There is more than the difference in taxes and the difference in interest charges.

[1106] By Mr. MOORE:

Q. What?

A. Well, if the projects are operated as a unit they can be operated to better advantage to the government in the handling of storage, in the release of stored waters, and in using the benefits that may result for further improvement of the river's power capabilities.

Q. Look at line 13, please, on that page, where you said: "It would reduce the feasibility of the plant 1.47 to 1.34."

What costs are the reductions in feasibility for 1.47 to 1.34 based on? Do you base that on present-day costs, or on costs included in House Document 650 estimates?

A. That is based on the 650, the figures revealed in 650.

Mr. MOORE. For convenience, we would like to have marked for identification at this point an exhibit, as Exhibit No. 53, which we would now like to have distributed.

CHIEF PRESIDING EXAMINER. Will you please describe it and tell us briefly what it is? Has it a title?

Mr. MOORE. The title is, "Ratio of Annual Benefits to Charges (Costs) All 11 Developments—Roanoke River, pages 7–8, House Document No. 650" and it

works the ratios down to the bottom of the page where it shows 1.3[illegible]

* * * * *

[1107] Q. Will you look at pages 7 and 8 of House Document 650, please, Mr. Hamilton, and then compare that with Exhibit No. 53, and tell us whether Exhibit 53 shows the manner in which your worked down to the figure of 1.34?

* * * * *

The WITNESS. Yes, I believe that is the way in which I arrived at the 1.34.

* * * * *

Q. Look at page 983 of your transcript. Is it not true [1108] that your answer on line 17 of this page as to the loss of $1,481,000 in benefits is also taken solely from the figures stated in House Document No. 650?

A. That is correct.

* * * * *

Q. Should you not have also eliminated the cost of operating the Roanoke Rapids plant, if you were going to refer to the loss in benefits, and why didn't you do it?

A. The amount of investment in Roanoke Rapids, as I remember it, is at $11,000,000. The benefits of Roanoke Rapids was far greater than what would result at the other project, any of the other projects. That loss of benefits would be applicable to all other projects. It is true that if we just take the figure by itself the cost of the other project should come out, but there are so many other advantages in com-

bination that the loss of these benefits may or may not appear as being the complete amount.

Q. As I understood your testimony on page 983 of the transcript you were there undertaking to compare the over-all feasibility of all the developments after eliminating Roanoke [1109] Rapids for private development.

Mr. HANKIN. I object to that question.

* * * * *

The WITNESS. The statement I made was that it reduced the benefits as set out in the comprehensive plan by $1,481,000.

By Mr. MOORE:

Q. You do not feel that in fairness you should have eliminated the cost of operating the Roanoke Rapids plant * * *

* * * * *

The WITNESS. No; I marked down here in my notes that we have saved $1,481,000; the investment would only be $11,000,000. Therefore, the amount "Cost of operation and other costs" that [1110] was entered in that $11,000,000, in my mind would not offset the greater benefits that would result, not only from the benefits as shown, but the benefits of the combined operation.

By Mr. MOORE:

Q. Well, isn't the figure $1,481,600, which you are using in your testimony, the figure opposite the words "Value of power in system"? That is on page 7 of House Document 650.

A. The next to the last line gives the total benefits in dollars.

Q. That same figure appears there, too, does it not?

A. That is right.

Q. You don't feel that you should also eliminate the cost of operating the project?

* * * * *

The WITNESS. I think it would have been better had I shown the operating cost, as well as the benefits.

By Mr. MOORE:

Q. Certainly it would. Isn't it an obvious error?

A. No; it is not an obvious error.

* * * * *

The WITNESS. It was not an error.

[1111] By Mr. MOORE:

Q. All right. You just say it would have been better?

A. Better, yes.

Mr. HANKIN. I did not hear that.

* * * * *

Q. You don't feel that in representing the value of power you need, generally speaking, to deduct the cost of producing that power?

* * * * *

The WITNESS. I think if that had been used it would eliminate this cross-examination on this feature.

By Mr. Moore:

Q. It certainly would have done that, wouldn't it? Can you give us any of the figures representing present-day conditions and costs which would be comparable to that figure of 1,481,000?

A. No, I cannot.

* * * * * *

TESTIMONY OF MR. HOLTZCLAW

DIRECT EXAMINATION

* * * * *

[204] Q. What is your judgment as to the future demands for electric energy in the area which will be affected by the development of the 11 projects on the Roanoke River in the so-called Roanoke River Basin as described in House Document No. 650?

A. It is my judgment that the demand for electric energy in the area which will be affected by the development of the projects on the Roanoke River will continue to grow very substantially. I would not hazard a statement that the [205] growth will continue to be at as high a rate as within the past twenty years, but developments in the use of electricity, well known to all of us, give ample ground for belief that the growth will continue for many years at a rapid rate. My previously introduced Exhibit number 19 shows that the growth in our need for power has been at the rate of about 10 percent, compounded annually, but in preparing our estimates for the years 1949 to 1954, inclusive, we have been on the conservative side. It is estimated that in 1954 the annual output of the Virginia Electric and Power Company system will be 4,000,000,000 kilowatt-hours, against 2,806,000,000 kilowatt-hours in 1948, an increase of 43 percent in six years, and that the maximum load will be 815,000 kilowatts as against 576,000 kilowatts in 1948, an

increase of 41 percent in six years. It will be noted on that exhibit that the annual system load factor, with the exception of the war years, has averaged about 56 percent, and we continue this in our estimate.

The company has a substantial steam plant development plan in process, with the latest completion date, according to present plans, of any of these units in 1951. No steam plants are planned at the present time beyond that date, since it is expected that Buggs Island and the proposed hydro development at Roanoke Rapids, if approved, will be brought in in 1952 and 1953. The proposed construction of the Roanoke Rapids hydro plant by Virginia Electric and [206] Power Company will not, in my judgment, substantially postpone the construction of or adversely affect any of the other projects on the Roanoke River which might be considered advisable for construction at a later date by the Government.

We have not attempted to obtain accurate estimates of future growth of the three other utility companies surrounding the Roanoke Basin, but it is my judgment that their growth will be comparable to that of Virginia Electric and Power Company. This being the case, the remaining developments on the river as proposed by the Government could be made whenever it is considered advisable to do so and the output absorbed by one or more of these utility companies with ease. The remaining developments as proposed by the Government are the Stuart Dam on the Smith River, the Schoolfield Dam on the Dan River, both of which are almost under the transmission lines of the Appalachian Company and the Duke Power Company.

Then on the Roanoke River the following dams, Leesville and Smith Mountain, lying between the lines of the Appalachian Company and Virginia Electric and Power Company, and the Tabor Dam, the Melrose Dam and the Randolph Dam are within easy transmission distance of Virginia Electric and Power Company's transmission lines.

It is my considered judgment that if it were decided by the Congress to authorize all of these dams for completion at [207] reasonable intervals, there should be no difficulty in marketing the entire output.

Q. In your judgment, will there be satisfactory demand for all of the electric energy that will be produced from the Roanoke Rapids project, Buggs Island and Philpott by the time each is completed?

A. It is my considered judgment that the demand for electric energy in the general area of the Roanoke River Basin will be sufficiently great to economically absorb all of the power produced from our Roanoke Rapids project as well as the power produced by the Buggs Island Dam and the Philpott development.

Q. If the development of the Roanoke River Basin, substantially as contemplated in House Document No. 650, is eventually carried out in a reasonable time, what, in your judgment, will be the probable ratio of supply to demand for electric power in the area affected?

A. In 1952, the combined generating capacity of the four public utility companies serving the area in and around the Roanoke River Basin will be approximately 4,100,000 kw. These four companies are the Virginia Electric and Power Company to the north

and east of the basin, the Carolina Power and Light Company and the Duke Power Company to the south of the basin, and the Appalachian Electric Power Company to the north and west of the basin. If the Buggs Island and Philpott [208] developments are completed by the government, and the Roanoke Rapids and Gaston sites developed as needed by Virginia Electric and Power Company, there remains in the other seven proposed developments a combined installed capacity of about 160,000 kw. The combined capacity of these remaining seven developments is less than one year's normal growth of the four interconnected utility companies which I have mentioned, so there is no reasonable doubt but that the output of the remaining seven small developments could be absorbed by the four systems as rapidly as they are developed.

In order to indicate the situation as to the transmission systems of these four companies as they relate to the proposed developments on the Roanoke River as outlined in House Document No. 650, I am presenting at this time an exhibit.

Mr. MOORE. May it please your Honor, we ask this exhibit be received as Exhibit number 21.

CHIEF PRESIDING EXAMINER. It will be received and given number 21.

(The document referred to was received in evidence as exhibit number 21.)

By Mr. MOORE:

Q. Will you proceed to comment on that exhibit, Mr. Holtzclaw?

A. This exhibit was prepared under my supervision and I believe it to be correct. This exhibit is basically a [209] photostat of Plate 24, which was a part of House Document No. 650. All of the 11 proposed developments on the Roanoke River and its tributaries are indicated on the map, and we have shown in different colors the main nearby high voltage transmission lines of the four utility companies which I have mentioned, Vepco in red, Appalachian Electric Power Company in blue, Carolina Power and Light Company in green, and Duke Power Company in purple.

It will be noted that everyone of the 11 proposed sites is either on or within easy transmission distance of the main transmission lines of one or more of the four utility companies serving the basin. Transmission lines indicated on the map are high voltage lines, all being either 66,000 volts, 110,000 volts or 132,000 volts, amply large, in my judgment, to satisfactorily handle all power proposed to be developed at these dams.

Q. In view of the conditions in the Roanoke River Basin, about which you have testified, in your judgment, would the marketing of the power produced at Buggs Island and the other projects proposed in House Document No. 650 be materially facilitated by the Government ownership and operation of the Roanoke Rapids project now proposed in this application for development by your company? And in this connection you may, if you so desire, contrast the advantages and disadvantages, from the standpoint of public interest, in the [210] development of the Roanoke Rapids project by your company with such

a development by the United States Government as outlined in House Document No. 650.

A. In my judgment, the construction and operation by Virginia Electric and Power Company of dams and powerhouses at Roanoke Rapids and even at Gaston at a later time would in no way adversely affect the marketing of the power to be produced at Buggs Island or Philpott, or any of the other proposed developments. Without any desire to "hog" all of the output, Virginia Electric and Power Company is prepared to contract for all of the power from Buggs Island upon its completion, provided, of course, mutually satisfactory terms can be agreed upon, of which we have no doubt.

In January of this year, we called upon the Power Division of the Department of Interior for the purpose of opening negotiations for the purchase of all or such part of the power to be produced at Buggs Island as the Department of Interior would see fit to contract with us for. We were advised by Mr. Seymour, the Director, that, in the absence of a deficiency appropriation, funds would not be available for surveying the power requirements of the area and negotiating for the sale of Buggs Island power until after July 1, 1949, at which time they would begin negotiations with our company for the sale of Buggs Island power to the company.

* * * * *

DIRECT EXAMINATION

[239] Q. Judging now from your experience and as the man [240] responsible for the efficient operation of the Carolina Company's power resources, could you make effective use of the Buggs Island power?

A. Yes, we could use a block of low load factor power to advantage and would be glad to obtain it.

Q. What would you use it for?

A. To carry peak loads.

Q. How much of Buggs Island power could you so use to advantage?

A. About one-half of the prime energy, and as much of the dump energy as we could take in over our transmission interconnection.

Q. What would limit the amount that you could take?

A. Unless an arrangement could be made with Virginia Electric and Power Company to utilize its transmission facilities, Carolina Company could not get much more than 50,000 kilowatts over its existing transmission line to Henderson. I do not believe it would be economical for the Carolina Company to build additional transmission facilities for the sole purpose of handling dump energy.

Q. Has the price of Buggs Island power been announced?

A. Not to my knowledge. I am assuming, of course, that the price and contract conditions would be reasonable. Obviously this power cannot be marketed if its price is greater than the customer would have to pay if they secured it by some other [241] means.

Q. Did you hear Mr. Holtzclaw testify in regard to the potential market for Roanoke River power?

A. Yes, I did.

Q. Have you anything to add to what he had to say?

A. Well, I think he understated the extent of the potential utility market for low load factor power. The Carolina Company, for example, is a part of a great interconnected power system composed of many utilities. It extends from Chicago through the Middle West to the Atlantic Seaboard and down to the Gulf of Mexico.

It is interconnected with other areas as well. Many of the companies are exclusively steam and thus are better able than Carolina Company to use low load factor hydro to advantage. I feel the potential market for Roanoke River power is even wider than the four systems totaling 4,100,000 kilowatts in capacity named by Mr. Holtzclaw.

Q. Should Virginia Electric and Power Company build Roanoke Rapids as here proposed, do you believe that the supply of low load factor power would be so large as to affect adversely the marketing of Buggs Island power?

A. No. On the contrary, I believe there is ample utility market for the two developments, even if brought into service at the same time.

* * * * *

CROSS-EXAMINATION

* * * * *

[378] By Mr. HANKIN:

Q. Mr. Robinson, on page 240 of the transcript you testified that you could use 50 percent of the power from Buggs Island, is that correct?

A. I did.

Q. Have any commitments been made to sell any power from Buggs Island to Carolina Power and Light Company?

A. None that I know of.

* * * * *

DIRECT EXAMINATION

[1011] Q. I direct your attention to a statement made by Mr. Holtzclaw on page 210 of the transcript concerning some advice allegedly given by you to the Virginia Electric and Power Company, and I ask you whether that is a correct statement. If it is not, would you state what actually took place?

A. Mr. Holtzclaw testified that representatives of the company called on the Power Division in January to open negotiations for the purchase of all or part of the power produced at Buggs Island. He testified, further, that he was advised during that conference that we would undertake to begin negotiations with his company for the sale of Buggs Island power to his company after July 1, 1949. Mr. Holtzclaw did not cover in his testimony other pertinent elements of the discussion and I might briefly summarize my recollection of what took place.

The company people asked that this conference be held, [1012] and it was held in response to their request, in my office. The company representatives advised us that one of the principal questions that they had in mind was to explore with us whether the Secretary of the Interior was serious in the position taken in his letter to the Federal Power Commision of January 6, in which he expressed his intention to oppose the application for a license for the Roanoke Rapids

project. We advised the company people that the Secretary intended to pursue the course stated in that letter, and intended to oppose the application on the grounds stated in that letter.

They asked us further what our plans were for marketing power from the Buggs Island project, and we advised them that we had not yet undertaken active negotiations, but we hoped to be in a position to undertake such negotiations soon after July 1, 1949, provided the Congress approved our request for funds for 1950. But in any case, we said that we were required by law to give preference to public bodies and cooperatives in the sale of power from Buggs Island, and we said that our preliminary studies of the market situation indicated that there would be a substantial demand among preferred customers for power from Buggs Island. We said, also, that we expected that there might well be valuable capacity and energy left over after the preferred agencies' requirements were satisfied which could be sold to utility company systems in the area. We said that we thought that the Virginia Electric and Power [1013] Company, because of its geographical location, was one of the prime prospects for that power, for that additional capacity and energy, and we said that we would expect to discuss the matter further with the company after we had carried on our marketing studies to a further degree of completion, and after we had carried on discussions with the preferred customers which would give us a clear enough idea of the market situation so that our further talks with the company would be most fruitful.

Q. On page 204 of the transcript, counsel for the applicant asked Mr. Holtzclaw concerning the further demand for electric energy in the area which may be affected by the eleven projects in the Roanoke River Basin, as described in House Document 650. I direct your attention to what was said by Mr. Holtzclaw in answer to that question from pages 204 to 207 of the record, and 207 to 208: Is it within the contemplation of the Secretary to turn all of this power over to the four utilities in the area? If your answer is in the negative, please state in detail why that is not within the contemplation of the Secretary.

A. Mr. Holtzclaw was testifying about the demand for power in the region, and the ability of the four utility companies to absorb the entire output of the projects proposed for construction in the Roanoke River Basin. He indicated [1014] that it was his judgment that these companies could very readily absorb all of the power to be made available from these projects. This judgment must have been based upon an erroneous impression of the policies under which this power will be marketed. The Secretary of the Interior is responsible for disposing of the power, and the Department has no intention of selling the entire output from these projects to the utilities in the area. Even if we desired to do so, I consider that it would be contrary to the specific requirements of Section 5 of the Flood Control Act of 1944 which direct the Secretary in the disposal of this power and give preference to public bodies and cooperatives and to sell power on the basis which will encourage

its widest possible use at the lowest rates consistent with sound business principles.

Several public bodies and cooperatives in the area have expressed a great deal of interest in buying this power. As our marketing plans for Buggs Island power develop we shall see to it that the requirements of these preferred customers are met to the fullest possible extent consistent with the objectives of the law. We interpret the directive of Congress contained in the law as giving public bodies and cooperatives the first call on this power, and that means that they have a priority over any other agencies, including the Virginia Electric and Power Company, and the other utility companies in the area. We intend to proceed in accordance [1015] with this interpretation of the the law.

[4171]

Exhibit 83

UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR

Iep–1

CONTRACT FOR ELECTRIC SERVICE TO GEORGIA POWER COMPANY

This contract is made on August 3, 1948, pursuant to Section 5 of the act of December 22, 1944 (58 Stat. 887, 890; 16 U. S. C. 1946 ed. 825s) between the United States of America (hereinafter called "the Government") represented by the Secretary of the Interior and the Georgia Power Company (hereinafter called "the Company"), a corporation organized and existing under the laws of the State of Georgia.

* * * * *

I. *Term of Contract*

This contract shall terminate 10 years after the date of initial delivery, unless sooner cancelled by either party upon written notice give not less than 3 years prior to the date of cancellation. The date of initial delivery hereunder shall be the date on which the Government is prepared to deliver energy from at least one of the 36,000 kw. generators. The Government shall give the Company reasonable advance notice of such date.

II. *Peak Period*

Under this contract, the peak period shall be the 100 hours of each seven-day week, as designated by the Company. All other time shall be the off-peak period. Energy delivered during any peak period shall be known as peak energy. Energy delivered during any off-peak period shall be known as off-peak energy.

The Company designates the hours between 6:30 A. M. and 11:30 P. M., Eastern Standard Time, during the five days, Monday through Friday, inclusive, and from 7:00 A. M. to 10:00 P. M., Eastern Standard Time, on Saturday, as being the peak period for initial operation under this contract. The Company shall have the right to change the peak period hours from time to time at intervals of not less than six months by giving the Government 10 days' prior written notice of such change.

* * * * *

IV. *Government Power and Energy*

There is reserved to the Government the right to use Allatoona energy for firm power service to facilities owned by the Federal Government, public bodies, and cooperatives, up to a maximum amount of energy in any calendar week of 2,500,000 kw.-h. Such energy shall be known as Government energy. The amount of Government power in kilowatts for any month shall be the maximum rate of delivery of energy to the Government over any period of 60 consecutive

minutes during the month. It is anticipated that, with the scheduling of operations as provided for in Article III, the energy generated at Allatoona at times will be less than the Government energy required at the time. During such times the Company will suppy enough energy from Company sources to make up the Government energy required.

* * * * *

VI. *Credits for Energy Supplied From Company Sources*

Energy supplied from Company sources, as provided for in Articles IV and V, shall be considered as energy exchanged for peak Allatoona energy supplied to the Company. In accomplishing this exchange, the Government will furnish to the Company one kilowatt-hour of peak Allatoona energy for each kilowatt-hour that the Company supplies to the Government from Company sources during peak periods, and one kilowatt-hour of peak Allatoona energy for each 1.2 kilowatt-hours that the Company supplies to the Government from Company sources during off-peak periods. It is recognized that in the operation of the Allatoona project, the above exchange may result in a balance of kilowatt-hours due the Company in certain months. In such event, in order to keep settlement current, there shall be a reduction in any payments otherwise due or later becoming due from the Company of 3.5 mills for each kilowatt-hour in the balance due the Company.

VII. *Rates and Charges*

(a) The Company shall pay for service under this contract as follows:

(1) A capacity charge of $32,500 per month when one 36,000 kw. unit is available for operation and $42,500 per month when two 36,000 kw. units are available for operation, less $1.00 per kilowatt of Government power for such month. A unit shall be considered as available for operation under this paragraph for the first thirty days of any period of outage. Partial months shall be prorated for billing purposes.

(2) 3.5 mills per kilowatt hour of peak Allatoona energy not compensated for by exchange energy.

(3) 2.0 mills per kilowatt hour of off-peak Allatoona energy.

(4) 2.0 mills per kilowatt hour of the electrical energy equivalent of water wasted as provided in paragraph (b) of Article III.

(5) A charge per hour per generating unit adequate to compensate the Government for the energy used in operating the generators as condensers as provided in Article XII. Such charge shall be determined by mutual agreement from operating tests made after the units have been installed or from factory test data.

(b) It is agreed that this contract does not provide compensation to the Government for benefits accruing to downstream plants of the Company or its affiliates as a result of storage or release of water in or from the Allatoona project.

* * * * *

TESTIMONY OF MR. CREIM

[2436] DIRECT EXAMINATION

* * * * *

Mr. HANKIN. The question pending, Your Honor, is whether the Southeastern Power Administration has already embarked upon the function of marketing power from projects under the control of the Army.

CHIEF PRESIDING EXAMINER. He may answer.

The WITNESS. Yes. Even prior to the establishment of the Southeastern Power Administration, the Secretary of the Interior entered into a contract with the Georgia Power Company for the sale of power from the Allatoona project. Prior to the establishment of the Southeastern Power Administration, the Secretary also entered into a contract with the Tennessee Valley Authority whereby he sold the entire output of three projects in the Cumberland River Basin to the TVA. The Administration of these contracts is now the responsibility of the Southeastern Power Administration.

[2437] Q. Is the document marked for identification as Exhibit No. 83 a copy of the contract entered into with the Georgia Power Company?

A. It is.

Q. What is the significance of this contract with the Georgia Power Company from the standpoint of the departmental policy in the marketing of power?

* * * * *

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A. The significance of the contract is that, while under Section 5 of the Flood Control Act of 1944 the Secretary [2438] is under obligation to give preference in the disposition of power to public bodies and cooperatives, it is the policy of the Secretary not to permit power to go to waste. If, at any time, or at any place, there is power available, it will be sold to privately owned utilities, reserving, however, so much of the firm power as is necessary to meet the requirements of preferred customers, as the requirements arise.

Q. What is the nature of the provision in the contract which illustrates this policy?

* * * * * *

The WITNESS. In this contract with the Georgia Power Company, the entire output of the Allatoona project was sold to the company, reserving, however, up to 2,500,000 kilowatt-hours per week, and I quote from the contract "for firm power service to facilities owned by the Federal Government, public bodies and cooperatives." If the energy generated at Allatoona is not sufficient to supply this need, then it is provided, and I again quote from the contract, "the company will supply enough energy from company sources to make up the Government energy required."

[2439] Q. Is there anything significant about the contract entered into with the TVA?

* * * * * *

The WITNESS. Yes. The Tennessee Valley Authority is a public body entitled to preference. The contract is an illustration of the fact that where preferred

customers are ready, willing, and able to purchase power from such projects, the power is sold to them.

By Mr. HANKIN:

Q. In these circumstances, do the requirements of public bodies and cooperatives determine the entire market for the power which you have to sell?

A. No, not at all. The power requirements of the public bodies and cooperatives determine the preferred market. The market for the power generally depends on the need for power in the area. This is an assured market, because the power is sold at cost, and at rates considerably lower than it can be produced by anyone else. So long as there is need for power in a given area, there is a ready market for the power produced at Army projects within economical transmission distance.

* * * * *

[2072] Cross-examination by Mr. SCHEIDENHELM:

Q. Colonel DeLuccia, in your direct testimony as shown in the transcript at page 1915, lines 10 to 12, by virtue of the question there asked, you have in effect stated that the Corps of Engineers consults with your Bureau of Power in the preparation of the Army Engineers' comprehensive plans for [2073] river basin development. Am I correct in that statement?

A. That is correct.

Q. Does the Power Commission through your Bureau, or otherwise, furnish the Army Engineers with opinions or estimates as to marketability and appraisals of value of the power output?

A. Yes, it does.

Q. Is that done by mutual arrangement or by custom, or as a matter of law?

A. The Flood Control Acts provide that the Federal Power Commission and the Chief of Engineers shall each make recommendations to the Secretary of War, now the Secretary of the Army, regarding the installation of power facilities in flood-control dams. In consideration of that requirement of the law, it is of course, necessary to indicate to the Chief of Engineers the reasons why the Commission should come to a conclusion, and among those reasons would be economic feasibility, the market for the power, and all other related matters.

Q. Do I understand correctly, then, it is not a matter of arrangement or custom independently of law, but is founded upon law and specifically that part of the Act of 1944, and other Flood Control Acts, which provide for recommendations by the Commission and Chief of Engineers for inspection as to whether penstocks shall be installed.

A. It is related to that requirement of the law; yes.

[2074] Q. Well, if it is merely related, what else enters into it?

A. I don't know that I understand, Colonel. The Commission is required, by the Flood Control Acts, to make this recommendation to the Secretary of the Army and I explained that in the making of such recommendation it was necessary to consider certain matters. I didn't include all the matters to be included, but illustrative of the general type of matter.

Q. Is there, within your understanding, any other element of law which requires such cooperation or coordination between the Army Engineers and the Federal Power Commission, other than that with regard to penstocks?

A. Well, of course, the Federal Power Act itself requires that the Federal Power Commission obtain the views, the recommendations of the Chief of Engineers regarding certain matters. So again there is a need for cooperation between the two agencies which is founded upon those requirements in the Federal Power Act.

Q. I am sorry I did not specifically in my last question limit it to the subject on which we started.

namely, estimates as to marketability and appraisals of value, and I intended so to do.

A. If you are talking about appraisals of value and marketability of power, the interest to the Corps of Engineers, and speaking as a layman and not as a lawyer, the interest to the [2075] Corps of Engineers arises in those cases where power is to be produced also in connection with multiple-purpose projects which they might construct, and in such cases they come to the Federal Power Commission for recommendations as to marketability, value of power, appraisal of the value of power, or whatever you might want to term it.

Q. Is there, within your knowledge or understanding, any law or portion of law, requiring the Federal Power Commission to make such estimates of marketability and appraisals of value other than those sections of the Flood Control Act which relate to the installation or noninstallation of penstocks?

* * * * * *

[2076] The WITNESS. I must, if I may, ask this question for clarification:

You are relating that particular question to the specific relationship between the Federal Power Commission in its cooperative work with the Corps of Engineers, are you not? What I am getting at is, that is not a general question applying to the whole field of the Commission's work?

By Mr. SCHEIDENHELM:

Q. No; it is specifically intended to be related, and I think stated to be related to the estimates furnished

as to marketability of power and appraisal of the value of the power output, prospective or actual from multipurpose projects, constructed or to be constructed by the Army Engineers.

A. There may be other statutes or other requirements of law, I don't know offhand.

* * * * * *

Exhibit 9

[3652] DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, 4 May 1949.

The CHAIRMAN,
Federal Power Commission, Washington, D. C.

DEAR SIR: Reference is made to the application (No. 2009) of the Virginia Electric and Power Company to the Federal Power Commission for a license to construct a hydroelectric project on the Roanoke River at Roanoke Rapids, North Carolina.

Mr. Farley of your staff has requested clearance to introduce into the minutes of the forthcoming hearing on this application a portion of the District Engineer's definite project report, dated 1 February 1946 on Buggs Island Reservoir, as follows: Pages a to m, inclusive; page 1 to 37, inclusive; pages VI–I to VI–18, inclusive; and Plates Nos. 27 and 55.

No objection is interprosed to use of this portion of the District Engineer's report in order to describe the Buggs Island project at the hearing. Your attention is invited, however, to the date of the report. Since that date the estimates of cost, annual benefits, and annual charges have been revised upward. Although these economic data are not pertinent to the

application, the latest estimates, as of July 1948, are as follows:

Estimated cost;	
Construction	$53,240,000
Relocations	18,390,000
Lands	7,240,000
Total estimated cost	78,870,000
Annual charges	3,811,000
Annual benefits:	
Flood control	535,000
Land enhancement	200,000
Power at site	3,762,000
Power at downstream existing plant	40,000
Fish and wildlife	78,000
Land rental and timber sales	54,000
Total evaluated average annual benefits	4,669,000

Sincerely yours,

LEWIS A. PICK,
Major General, Chief of Engineers.

DIRECT EXAMINATION

[242] Q. How much energy do you supply to them? [Eastern North Carolina cooperatives.]

A. In 1948, we furnished them 25,607,935 kilowatt-hours. Their combined peak demand for the year 1948 was 9,810 kilowatts.

Q. What did you charge them for this energy?

A. Seven and a half mills a kilowatt-hour.

Q. Is this not a low rate?

A. Yes; it is very low.

Q. How was that rate fixed?

A. It was fixed by the North Carolina Utility Commission.

Q. Do you know what the co-ops will have to pay for Buggs Island power?

A. I do not. I would assume, however, that whoever markets Buggs Island power would have to undersell Carolina Power and Light Company in order to take our co-op customers away from us.

Q. Do you believe that Buggs Island can do this and still money out?

A. I do not see how it can in light of the figures given out by the Army Engineers about the project.

Q. Will you at this point kindly explain your remarks on that point?

A. Exhibit 9, dated May 4, 1949, shows the estimate of [243] cost, annual charges, and annual benefits as made by the Army Engineers, as of July 1948.

Q. That is Exhibit 9, as filed in this proceeding?

A. That is right, sir.

* * * * *

A. In this exhibit the annual charges are shown as $3,811,000. If the total benefits, excluding the benefits shown for power at site, are deducted from these annual charges, we have $2,904,000 annual charges remaining, which would have to be made up from the sale of power at site.

The hearings of the Interior Department for the fiscal year 1948, part 1, page 130, give the average annual energy from the project as 410,000,000 kilowatt-hours, of which 200,000,000 kilowatt-hours would be firm.

Q. Right there a moment, you say the hearings of the Interior Department. You mean hearings before the Committee of Congress, do you not?

A. That is right, sir.

Q. Considering appropriations with respect to Buggs Island?

A. Yes.

[244] Q. All right, sir.

A. Secondary energy is of no use to a co-op unless such co-op has its own generation. It must have firm power available every day of the year. The secondary energy is available only when and if there is water enough. Its only value is for fuel saving to a steam or diesel generating system. If we assume that Buggs Island could get on the average three mills

per kilowatt-hour, the secondary power would bring in about $630,000 a year. This, deducted from the $2,904,000 mentioned above, would leave $2,274,000 to come from the firm power. This would mean 11.37 mills per kilowatt-hour for firm power.

Q. Are we to understand it is your best judgment that that 3 mills figure for the secondary power is about the best that could reasonably be expected?

A. In my opinion that is on the high side for an average to be obtained for dump power.

Q. Have you figured the necessary sale price of the firm power required to meet the annual benefits shown on Exhibit 9 in this proceeding, that is, $3,762,000?

A. Yes. If we deduct from the $3,762,000 a value of $630,000 for the dump power, we show a remaining benefit to be realized from the firm power of $3,132,000. This would mean 15.66 mills per kilowatt-hour. I cannot see however it may be figured, how Buggs Island can undersell the neighboring utilities to any of their customers and still money out.

* * * * *

CROSS-EXAMINATION

[378] A. That is in the answer on page 244 in answer to the question that was asked at the bottom of the page. Shall I read it?

Q. I think it would be well for you to read that in right here.

A. "Have you figured the necessary sale price of the firm power required to meet the annual benefits shown on Exhibit 9 in this proceeding, that is, $3,762,000?"

Q. You arrived at a figure there, in answering that question, of 15.66 mills per kilowatt-hour. That is a very high energy charge, is it not?

A. That is a high unit cost; yes.

Q. And is it not so high it would be prohibitive?

A. Well, I would hate to pay it. I wouldn't say it is prohibitive but it is an extremely high figure.

* * * * * *

[379] Q. Now, on pages 243 and 244 you estimated the rate at which Buggs Island power would be sold and I believe you based your conclusions upon a letter which is identified herein as Exhibit 9, is that correct?

A. I estimated the price at which the power would have to be sold to meet either of two figures shown on Exhibit 9.

Q. Do you assume that the rates for Buggs Island are going to be set by the Chief of Engineers or by the Secretary of the Interior?

A. I have no opinion on that.

Q. You simply took it for granted that these figures will constitute the basis upon which the rates will be fixed, is that right?

A. Not necessarily, in that I don't know how you arrive at a sale price. I should think you would have to take into account load factor and everything else.

Q. If you don't know what factors are taken into consideration how could you make that computation?

A. The computation, as I stated, is made only to arrive at a figure per kilowatt-hour.

Q. Let me ask you this: Do you know what is the cost of the project allocated to power? What is the investment that would be allocated to power?

A. I do not know, sir.

Q. Do you know that Buggs Island is a multipurpose [380] project?

A. I understand it is.

Q. And that some part of the cost or investment is borne by flood control, some part by other purposes, and there is a certain part allocated to power? Do you know what part would be allocated to power?

A. I do not.

Q. Do you know on what basis the Secretary of the Interior will compute amortization of the investment allocable to power?

A. Would you restate that?

Q. Do you know on what basis the Secretary of the Interior will compute amortization of the investment which is allocable to power?

A. I do not.

Q. Do you know what will be the operating expenses which will be allocable to power?

A. I do not.

Q. Do you know how much will be the downstream benefits to Gaston and Roanoke Rapids when constructed?

A. I do not, I can only go on these figures shown in Exhibit 9, in that respect.

Q. Now, if you do not know all these factors that go into the computation of rates on multipurpose projects, why did you make this computation?

[381] A. This computation was made to show what would have to be brought in per kilowatt-hour, in my opinion, to meet either the annual charges or the value of power at site.

Q. Without taking into consideration the allocation to power?

A. Only on the basis of the Engineers' figures that have been presented.

Q. Please answer my question. You say on the basis of these figures it is sufficient to arrive at the cost without taking into consideration an allocation of the investment or operating expenses to power?

A. I did not take into account those factors.

Q. Do you know that those matters have to be taken into consideration?

A. We would take into consideration all factors if we were building the dam.

Q. I say, do you know that these factors have to be taken into consideration?

A. I don't know what factors the Interior Department takes into account, no sir.

* * * * *

Exhibit 43

[4039] UNITED STATES DEPARTMENT
OF AGRICULTURE,
RURAL ELECTRIFICATION ADMINISTRATION,
Washington 25, D. C., May 25, 1949.

The Honorable J. A. KRUG,
The Secretary of the Interior, Department of Interior,
Washington 25, D. C.

DEAR MR. SECRETARY: It is our understanding that several of our borrowers in Virginia and North Carolina have been conferring with the Division of Power with reference to their future power requirements, and at their request, this will confirm the load estimates previously given to the Division of Power by them.

On the basis of loans made and applications pending for the extension of rural electrification in these two states, and on loan applications expected to be submitted prior to 1953, it appears that the 1955 requirements of the borrowers who have made application for power from Roanoke River hydrodevelopments will be approximately as follows:

	Number of borrowers	Number of consumers	Kilowatt demand	Annual kilowatt-hour requirement
Virginia	11	75,000	58,000	226,000,000
North Carolina	17	70,000	40,000	148,000,000
Total	28	145,000	98,000	374,000,000

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The kilowatt demands as shown represent the arithmetic sum of the noncoincident peak demands at substations of the borrowers' systems. The kilowatt-hour requirements represent the energy requirements at the borrowers' substations and, therefore, include distribution losses.

The names and addresses of the REA-financed cooperatives for which load data are shown are as follows:

VIRGINIA

Craig-Botetourt Electric Cooperative, New Castle, Virginia.

Shenandoah Valley Electric Cooperative, Dayton, Virginia.

Virginia Electric Cooperative, Bowling Green, Virginia.

Southside Electric Cooperative, Crewe, Virginia.

[4040] Northern Neck Electric Cooperative, Warsaw, Virginia.

Central Virginia Electric Cooperative, Lovingston, Virginia.

BARC Electric Cooperative, Millboro, Virginia.

Mecklenburg Electric Cooperative, Chase City, Virginia.

Northern Piedmont Electric Cooperative, Culpeper, Virginia.

Prince George Electric Cooperative, Waverly, Virginia.

Community Electric Cooperative, Suffolk, Virginia.

Pitt & Greene Electric Membership Corporation, Farmville, North Carolina.

Edgecombe-Martin County Electric Membership Corp., Tarboro, North Carolina.

Four-County Electric Membership Corporation, Burgaw, North Carolina.

Roanoke Electric Membership Corporation, Rich Square, N. Carolina.

Piedmont Electric Membership Corporation, Hillsboro, North Carolina.

Halifax Electric Membership Corporation, Enfield, North Carolina.

Brunswick Electric Membership Corporation, Shallotte, North Carolina.

Jones-Onslow Electric Membership Corporation, Jacksonville, N. Carolina.

Wake Electric Membership Corporation, Wake Forest, N. Carolina.

Tri-County Electric Membership Corporation, Goldsboro, North Carolina.

Lumbee River Electric Membership Corporation, Raeford, North Carolina.

South River Electric Membership Corporation, Stedman, North Carolina.

Carteret-Craven Electric Membership Corporation, Morehead City, N. Carolina.

Pamlico-Beaufort Electric Membership Corporation, Grantsboro, N. Carolina.

Central Electric Membership Corporation, Sanford, North Carolina.

Woodstock Electric Membership Corporation, Belhaven, North Carolina.

Albemarle Electric Membership Corporation, Hertford, North Carolina.

The above estimates are based on system load studies prepared in the field by members of our Staff in 1948.

Sincerely,

CLAUDE R. WICKARD,
Administrator.

cc: Federal Power Commission, Washington, D. C.

* * * * *

[1638] Direct examination by Mr. MOORE:

Q. Mr. Spellman, you previously testified that you are in a position to be informed as to the extent to which Virginia Electric and Power Company furnishes the requirements of the REA Cooperatives in Virginia. Will you now state if you are also in a position to be informed as to the extent to which your company furnishes the requirements of the REA Cooperatives in North Carolina?

A. I am.

Q. Does your company sell power to cooperatives in North Carolina?

A. Yes.

Q. Will you indicate to what extent your company supplies the requirements of the cooperatives in North Carolina?

[1639] A. As of December 31, 1948, Virginia Electric and Power Company supplied power to five cooperatives; the entire requirements of three cooperatives directly; part of the requirements of one cooperative directly; and part of the requirements of one indirectly.

Q. Are you also informed as to the extent to which other power companies furnish the requirements of the REA Cooperatives in North Carolina?

A. I am.

Q. Are you familiar with Exhibit No. 43, that is Mr. Wickard's letter, dated May 25, 1949, to Mr. Krug, previously referred to in this case?

A. I am.

Q. Have you, for the purpose of illustrating this case, the location of the points of supply of the 17 cooperatives in North Carolina, listed in Mr. Wickard's letter, Exhibit 43, prepared a map showing these features?

A. I have.

Mr. MOORE. Your Honor, we ask that this map, which is entitled, "Map of Eastern North Carolina, Showing Points of Delivery of Power to the Following (17) REA Cooperatives at December 31, 149," be marked for identification as "Exhibit No. 59."

CHIEF PRESIDING EXAMINER. It will be marked "Exhibit No. 59" for identification.

[1640] (The document above referred to was identified as exhibit No. 59.)

By Mr. MOORE:

Q. Mr. Spellman, is the map which I have just presented to you the one which has been prepared as you describe?

A. It is.

* * * * *

[1643] Q. What is the meaning of the red arc in the upper section of the map?

A. The red arc has a radius of 75 miles from Buggs Island dam site.

Q. Why did you use a radius of 75 miles when inscribing this arc on the map?

A. I used it to indicate the approximate limits of a reasonable transmission distance from Buggs Island.

Q. How many of the 39 points of delivery for the 17 cooperatives are within 75 miles of the Buggs Island dam site?

A. Only ten, or approximately one-fourth of the 39 delivery points for five of the 17 cooperatives are located within 75 miles of this dam site.

Q. Have you information concerning the maximum demands and total energy supplied these five cooperatives at these ten delivery points during 1948?

[1644] A. The arithmetic sum of the noncoincident peak demands for these five cooperatives during 1948 is approximately 4,000 kilowatts, and the total energy supplied them was approximately 13 million kilowatt-hours.

Q. What were the total requirements during 1948 for the 17 cooperatives as you found from your investigation?

A. Approximately 16,000 kilowatts and 46 million kilowatt-hours.

Q. What percent of the total 1948 requirements of all 17 cooperatives was supplied the five cooperatives at delivery points within 75 miles of the Buggs Island dam site?

A. Approximately 25 percent of the total noncoincident maximum demand and approximately 28 percent of the total kilowatt-hours were supplied these five cooperatives in 1948.

Q. What is the distance of the delivery point located the greatest distance from the Buggs Island dam site?

A. The delivery point which is the greatest distance from this dam site is the one supplied the Brunswick Electric Membership Corporation just west of Wilmington. The approximate distance of this delivery point from the Buggs Island dam site is 170 miles, as the crow flies. The actual transmission line distance undoubtedly would be much greater.

Q. What are the distances from the Buggs Island dam site to some of the other delivery points at remote locations from this dam site?

[1645] A. The approximate airline distances of some of the other delivery points remote from the Buggs Island dam site are:

Brunswick Electric Membership Corporation, near Whiteville, 160 miles;

Carteret-Craven Electric Membership Corporation, near Morehead City, 160 miles;

Lumbee River Electric Membership Corporation, near Lumberton, 150 miles;

Four County Electric Membership Corporation, near Clarkton, 150 miles;

Four County Electric Membership Corporation, near Burgaw, 150 miles;

Jones-Onslow Electric Membership Corporation, near Jacksonville, 135 miles.

Q. How many of the cooperatives, as shown on this map, are connected by transmission lines?

A. None, to my knowledge.

Q. Mr. Spellman, you previously testified that you prepared a map showing the location of the points of power supply of the 11 member cooperatives in Virginia, and this map has been filed as Exhibit No. 18

in this case. Have you also prepared a map showing the relative locations of these points of supply with respect to Buggs Island and also with respect to the 11 Virginia REA Cooperatives listed in Exhibit 43?

[1646] A. I have.

Mr. MOORE: We ask, your Honor, that the map which has now just been presented, entitled, "Points of Delivery of Power to the Following 11 REA Cooperatives in Virginia at December 31, 1948," be marked as "Exhibit No. 60."

CHIEF PRESIDING EXAMINER. Let it be so marked.

(The document above referred to was identified as Exhibit No. 60.)

By Mr. MOORE:

Q. Is the map which I now present to you the one which has been prepared?

A. It is.

Q. Will you state what is the basis of this map upon which you have prepared this illustration of these features?

A. It is the same base map as Exhibit No. 18.

Q. Is this map to scale?

A. It is. The scale is approximately 24 miles to the inch.

Q. What features have you added on the map to describe the location of the 11 Virginia REA Cooperatives listed in Exhibit No. 43?

A. As shown in the tabulation in the upper left-hand corner of the map each of the 11 cooperatives is designated by a number. The number shown beside each delivery point on the map indicates the cooperative supplied at that location.

[1647] Q. Are the REA Cooperatives, as listed in Exhibit 43, and shown in the tabulation in the upper left-hand corner of this map, the same cooperatives which you considered when preparing Exhibit No. 18?

A. They are identical.

Q. Are the points of delivery for these 11 cooperatives on the map the same as in Exhibit No. 18?

A. They are identical. I merely added on this map the reference numbers beside each delivery point to denote the cooperative supplied at that location.

Q. What is the meaning of the solid green square at the bottom of the map?

A. The solid green square denotes the approximate location of the Roanoke Rapids project.

Q. What is the meaning of the solid red square at the bottom the map?

A. The solid red square indicates the approximate location of the Buggs Island dam site.

Q. What is the meaning of the red arc on the map?

A. The red arc has a radius of 75 miles from the Buggs Island dam site.

Q. You have just testified that with respect to your Exhibit No. 59, you used a radius of 75 miles when inscribing the arc on the North Carolina map to indicate the approximate limits of reasonable transmission distance from Buggs Island.

[1648] Did you use a similar radius of 75 miles when preparing the Virginia map for the same reason?

A. I did.

Q. How many of the 20 points of delivery for the 11 cooperatives in Virginia are within 75 miles of the Buggs Island dam site?

A. Only 10, or one-half of the 20 delivery points for five of the 11 cooperatives, are located within 75 miles of this dam site.

Q. Have you information concerning the maximum demands and the total energy supplied these five cooperatives at these ten delivery points during 1948?

A. The arithmetic sum of the noncoincident peak demands for these ten delivery points during 1948 is approximately 10,000 kilowatts, and the total energy supplied at these points was approximately 29 million kilowatt-hours.

Q. What were the total requirements during 1948 for all of the 11 cooperatives?

A. Approximately 21,600 kilowatts, and 75 million kilowatt-hours.

Q. What percent of the total 1948 requirements of all 11 cooperatives was supplied the five cooperatives at delivery points within 75 miles of the Buggs Island dam site?

A. Approximately 46 percent of the total noncoincident maximum demand and approximately 39 percent of the total kilo-[1649]watt-hours were supplied the cooperatives at these delivery points in 1948.

Q. What is the distance of the delivery point located the greatest distance from the Buggs Island dam site?

A. There are three delivery points which are about the same distance and farthest from this dam site. The one for the Northern Piedmont Electric Cooperative near Culpeper, designated by a "9" on the map; the one for the Shenandoah Valley Electric Cooperative at Dayton, designated by a "2" on the map; and the delivery point for the Northern Neck Electric

Cooperative near Oak Grove, designated by a "5" on the map, are all approximately 130 miles airline from Buggs Island.

However, testimony already has been given that the practical route for a transmission line to supply the Northern Neck Electric Cooperative's load near Avalon would be considerably longer, due to rivers, and I calculate that the actual distance would be nearer 150 miles. It is undoubtedly true that the actual route of any transmission line is longer than the airline distance.

* * * * * *

CROSS-EXAMINATION

* * * * *

[1786] Q. Now, coming to Exhibits 59 and 60, these exhibits show, do they not, that you have drawn an arbitrary radius of 75 miles from Buggs Island on these two maps?

A. I wouldn't say it was arbitrary. There is an arc on there.

Q. Well anyway, that red line that runs around Buggs Island is 75 miles from it on all sides, at all points, is it not?

A. The radius of that arc is 75 miles from Buggs Island, that is right.

Q. I believe you said something about this 75 miles being the reasonable transmission distance. In that connection I will ask you, Mr. Spellman, are you an engineer or not? Did you pick out the 75 miles?

A. No, the company engineers furnished me information indicating that that, in their opinion, was the reasonable [1787] limit of an economical transmission distance, and I used that.

Q. That is not new or original with you? You don't vouch for it?

A. No, sir. I might add, that is in agreement, if I am not mistaken, with the distance that Dr. Jessel used.

Q. Dr. Jessel said 75 to 100 miles, as I recall it, quite distinctly.

A. 75 for REA loads and a hundred, maybe, for larger, I don't know.

* * * * *

By Mr. WHITEHEAD:

Q. But whether it is 75, 100 or 150, that is not your figure?

A. That is right.

Mr. WHITEHEAD. Mr. Examiner, in view of the fact that Mr. Spellman has not testified that he is acquainted with the limitation of the radius for a reasonable transmission distance, I feel it is proper and I now move that Exhibits [1788] 59 and 60, which show this radius, this 75-mile limit from Buggs Island, be stricken.

CHIEF PRESIDING EXAMINER. I will take that motion under advisement, but I want to hear a little further on it.

* * * * *

[1808] Q. Suppose on Exhibits 59 and 60, Mr. Spellman, you drew a curve, you drew a circle having a radius of 100 miles, how many of these cooperatives would be included within the service area?

A. Without drawing that to scale, I couldn't answer you exactly. That can be readily determined.

Q. If you can determine it readily, it can save time, if [1809] you would right now.

A. I would have to have some instrument or something, in order to swing a radius.

CHIEF PRESIDING EXAMINER. How long would it require starting at this minute?

The WITNESS. Well, I don't think it would take too long.

CHIEF PRESIDING EXAMINER. I want to know, though, would it take five minutes?

The WITNESS. It might take possibly five minutes for both of them.

CHIEF PRESIDING EXAMINER. We cannot have that done on the stand, Mr. Hankin.

By Mr. HANKIN:

Q. Will you do it off the stand, and then come back with the answer to that question when you are ready?

Mr. MOORE. We object to that, your Honor. There is no basis for it really in the record. As I pointed out to you this morning, the use of 100 miles was tied in by Dr. Jessel to municipal plants with steam generation. If Mr. Hankin wants to have an arc put on the map, he has witnesses that can do that.

CHIEF PRESIDING EXAMINER. You will not have your witness do that?

Mr. MOORE. No, sir; we do not want to stop to do that.

CHIEF PRESIDING EXAMINER. Very well, it is a matter for [1810] you. Mr. Hankin, you have heard his response to it, so let us go ahead with your cross-examination.

Mr. HANKIN. I have heard the response, your Honor, and I take it you are not going to direct the witness to furnish that information.

CHIEF PRESIDING EXAMINER. It is counsel's privilege.

* * * * *

[1811] Q. Mr. Spellman, if you drew a curve of 150 miles, would that include all the cooperatives?

A. In which state?

Q. In both of them.

A. Without actually working it out, I would say that in Virginia, with the locations spotted on this map, it appears it might include all. In North Carolina it would not include all of them.

Q. Can you state offhand how many that would not include?

A. I couldn't, without swinging an arc on there and actually doing it.

Q. Can you take a pencil and measure it off?

A. If you want just a rough estimate.

Q. Yes, just a rough statement.

A. Possibly three or four would still be outside that radius. That is very rough.

Q. Do you consider that 196 miles from Markhams Ferry, Oklahoma, to Jones Mills, Arkansas, is an economical transmission [1812] distance?

* * * * *

The WITNESS. I will answer it this way: Many factors govern the determination of any economic transmission distance.

By Mr. HANKIN:

Q. In other words, distance is not the only factor?

A. The distance is a very important factor.

Q. Yes; but it is not the only factor, is it, is that what you wanted to say?

A. There are other factors, but distance certainly is a very important factor.

Q. Do you consider that the 250 miles from Grace, Idaho, to Anaconda, Montana, is an economic transmission distance?

* * * * *

[1813] The WITNESS. The same answer would apply, except that I imagine in Montana, if you have 200 and some-odd miles, like you mentioned, you have a lot of ups and downs that might get into it, too.

By Mr. HANKIN:

Q. Do you know whether electric energy is being transmitted over those distances?

A. You mean in Idaho and in Arkansas? I have never been out there.

Q. You don't know?

A. No, sir.

* * * * *

[2302] Redirect examination by Mr. GIBSON:

Q. Mr. Cary, Mr. Spellman was asked on cross-examination as to whether he had a judgment on this matter of 75 miles being a reasonable transmission distance, and he stated that the judgment was not his, that he obtained it from the Engineering Department.

* * * * *

[2304] By Mr. GIBSON:

Q. Mr. Cary, I will ask you whether, in your judgment arrived at with your staff, it would be possible to transmit power from Buggs Island to the 27 REA Cooperatives in Virginia and North Carolina listed in Exhibit 43?

A. Yes; physically it would be possible.

* * * * *

Mr. GIBSON. I was going to ask him, your Honor, if Mr. Spellman, in preparing his maps, introduced as Exhibits 59 and 60, consulted with Mr. Cary as to what would be a reasonable limit of economical transmission, in connection with the transmission of power from Buggs Island to the various cooperatives in this area.

* * * * *

[2305] By Mr. GIBSON:

Q. Did you give him such a figure?

A. I did.

* * * * *

Q. And what was that figure?

A. Seventy-five miles.

* * * * *

[2309] Cross-examination by Mr. WHITEHEAD:

Q. You have testified that when Mr. Spellman drew this radius of 75 miles from Buggs Island, it was done, as I recall—you said—on your advice as an engineer?

A. That is correct.

Q. That 75 miles represents what?

A. It represents the concensus of opinion of our engineering staff as to the outside limit or maximum reasonable distance that it would be economical to transmit power from the Buggs Island project to serve the REAs in question.

Q. And that assumption is based, is it not, upon the further assumption that there is to be no other power available to the REA Cooperatives?

A. No.

Q. By way of firming up its power?

A. Yes; it was based on the assumption that the REAs did not have generating facilities.

Q. Or would not have generating facilities?

A. Would not have generating facilities.

[2310] Q. Therefore, if there is other power available to the cooperatives for firming up the Buggs Island power, then this radius of 75 miles would have to be extended, would it not?

A. I seriously doubt it. The establishment of generating facilities by the REAs would make possible the transmission of power a greater distance, but it would not necessarily make it economical.

Q. Well, would it necessarily make it uneconomical?

A. Not necessarily.

Q. Well, would you say it would be uneconomical or economical, or are you prepared to say?

A. I can only give an opinion. The actual determination would require considerable study, but it is my opinion that it would not be economical, particularly if you include the cost of the generating facilities.

Q. Is it not a fact that Virginia Electric and Power Company does provide substations with service in the neighborhood of 75 or more miles from the source of power?

A. Yes; we do transmit power more than 75 miles.

Q. And do you not transmit it and sell it to the cooperatives at their substations more than 75 miles from the source of power?

A. Yes, we do.

Q. Then why do you tell us that your company can do it economically, but you seriously doubt whether the REAs, who are [2311] also engaged in the electric business, could do it economically?

A. Because we supply a whole lot more power by our transmission system than these REA systems would have. Furthermore, in our case, there is no alternative source of power. The alternative source of power has a lot to do with determining whether it is economical or not. In this case, the REAs have an alternative source of power.

Q. And that alternative source of power is the power supplied by the Virginia Electric and Power Company at the one cent rate?

A. Our company, or some other company.

Q. Well, you know in fact, that the Virginia Electric and Power Company either directly or indirectly is the sole source available to them at present, don't you, outside of some small generating facilities?

A. I think that is true for most of them. It is not true for all of this group.

Q. Can you name anyone it is not true for? If so, I ask you to do it.

A. My statement covers North Carolina, too. You were confining your remarks just to Virginia.

Q. Well, you can take in both, if you wish.

A. For the group of REAs in Virginia, it appears that the Virginia Electric and Power Company is the only alternative source of power for all except possibly the one near Dayton where they have their own generating station and a separate system.

[2312] I believe there is one more exception, the one west of Buchanan, Virginia, there. I am not thoroughly familiar with the details, and I may not be quite right on that, but it appears to be isolated.

Q. You are referring now to the Craig-Botetourt Electric Cooperative, located at Newcastle?

A. I don't have the name here, but I believe that is correct.

Q. Do you know that presently it is getting power from Virginia Electric and Power Company?

A. As I stated, I am not thoroughly familiar with all the details there. It is getting some of its power from us, but I was under the impression that they also had an isolated system there.

Q. And is it not a fact that the one located at Dayton, which happens to be the Shenandoah Valley Electric Cooperative also is buying auxiliary power from Virginia Electric and Power Company?

A. I think there it is only for certain small parts of their system which are isolated from their regular system and connected to ours.

* * * * *

[2313] By Mr. HANKIN:

Q. Mr. Cary, when you talk about economical transmission distance, do you mean to include the economics in view of the business of the company transmitting that power?

A. Not necessarily.

Q. You don't mean that sometimes the company may find it economical from the standpoint of its business to transmit energy at a lesser profit than they would otherwise?

* * * * *

The WITNESS. I am not sure that I quite understand that question.

By Mr. HANKIN:

Q. It is simple enough.

A. You confined your question to transmission. If you had a separate transmission company the answer might be different from what it would be if the company, who needed the power at the receiving end was also supplying its transmission system itself and doing its own transmitting. It seems to me like there are two cases there, and I couldn't tell whether you were making a distinction between the two cases or not.

Q. Suppose you assume both, and then answer my question.

* * * * *

[2314] The WITNESS. The point that is confusing me is that he brings in there tranmitting at a lesser profit. The word profit has not come into this discussion.

* * * * *

[2315] Mr. HANKIN. Very well, let me ask another question.

By Mr. HANKIN:

Q. Can you conceive of the possibility that an electric company like yours might want to transmit power at a loss, in order to capture a certain market?

A. I think that could very well be the case for a short period of time, but I don't think it would be done with the idea of doing it and taking a loss continuously.

Q. Certainly. And if that is the case, would that constitute an economical transmission distance, for a short period?

[2316] CHIEF PRESIDING EXAMINER. In your view of the matter.

The WITNESS. It probably would not be economical for the short period, but for the long period it might very easily be economical.

By Mr. HANKIN:

Q. Now, you were here when I asked Mr. Spellman about the instances where power is being transmitted over 196 miles and 250 miles, were you not?

A. I remember the questions generally, but not in detail.

Q. In view of the fact that power is being conveyed over such long distances, don't you think that the radius of 75 miles is somewhat of an under-statement?

A. I do not.

* * * * *

* * * * *

[793] Cross-examination by Mr. WHITEHEAD:

Q. Dr. Jessel, in order to refresh our memories I turn again to page 614 of the transcript.

A. Yes, sir.

Q. Where I find you say, "I also studied load growth and load characteristics of the municipal and REA Cooperative systems which are located within reasonable transmission distance of the Buggs Island project." What did you mean by the phrase "within reasonable transmission distance of the Buggs Island project"?

A. In selecting the REA and municipal systems which I studied I enclosed mentally an area within which, in my opinion, the logical power market might be for the project output.

Q. How did you determine that radius?

A. It was largely a matter of judgment which was based [794] on many years of experience of similar studies.

Q. And upon what was your conclusion based?

A. Upon about 75 miles for the smaller systems and up to about a hundred or so where you have large municipal systems with their own generating capacity.

Q. About 100 miles for the municipal systems which had their own?

A. That is right. That is approximately the area; I did some selecting within those limits.

based upon the assumption that Buggs Island was the only source of power available to the REA Cooperatives?

* * * * *

A. * * * Essentially, no, for this reason: I first took the Buggs Island project to see how large a load would have to be realized in order to utilize the full output of Buggs Island project; assuming provision of adequate amounts of steam stand-by capacity. Now, that amount of load, as I stated before, was 134,000 kilowatts and 492 million kilowatt hours of load. That load was larger than any I could estimate within that radius, much larger.

* * * * *

CROSS-EXAMINATION

* * * * *

[1558] By Mr. MOORE:

Q. Mr. Seymour, are you able to give the Commission any information based upon investigations made by you or by your staff in Interior, under your supervision, as to the kilowatt load or kilowatt-hour requirements of cooperatives in the year 1955, within reasonable transmission distance of Buggs Island or the Roanoke Rapids project?

[1559] A. Mr. Moore, our staff made an investigation to the extent of getting from the Rural Electrification Administration their best estimates of those power requirements. As you perhaps know, the staff of the Division of Power is small and we have made the investigation in this matter to the extent of getting the best figures we could get from the best available source open to us at the time, in the light of our limitations.

Q. And that was from the R. E. A.?

A. Yes, sir.

Q. Now, Mr. Seymour, in the light of that answer will you kindly look at Exhibit 43?

A. Yes, sir.

Q. You testified that was one of the pieces of information furnished to you.

A. Yes, sir.

Q. Now, have you or your staff under your supervision made any study to determine whether power from the Buggs Island project would be economically available to the delivery of power to the Brunswick Electric Membership Corporation, which is one of the cooperatives shown on page 2 of that letter? If you will look at North Carolina, it is the seventh one listed.

A. No, sir.

Q. If it should appear that the distance from Buggs Island to the normal delivery point or points for power to that cooperative, was in excess of 150 miles, could you give us any [1560] reliable information as to whether or not power from the Buggs Island project would be available economically for delivery to that cooperative?

A. It might be, or it might not be.

Q. You couldn't say?

A. It would take an examination of the methods of delivery and what the costs might be. There are ways in which the power could be economically delivered at that distance.

* * * * *

By Mr. MOORE:

Q. Would not the same answer apply, without my repeating all that detail, with respect to each and every one of the cooperatives listed in Mr. Wickard's letter?

A. No, sir. Some of those cooperatives are located within very close proximity of the Roanoke River Basin, and there isn't any question at all that power

can be delivered to points within that region which would meet the magnitude of the requirements of agencies such as these. You spoke of one which was pretty far-removed and mentioned 150 miles.

Q. Yes.

A. That does raise the question as to how one could get the power from Buggs Island to that cooperative economically.

[1561] I have seen power delivered to a cooperative over a 200-mile distance. I have also seen requests for power turned down on the grounds of nonfeasibility that were only 20 miles away.

Q. Would not the same answer that you gave with respect to the Brunswick Electric Cooperative apply to the several others shown on the map, just for illustration, such as the Carteret-Craven Electric Membership at Moorehead City, the Lumbee River Electric Membership Cooperative at Lumberton, North Carolina, and the Jones-Onslow Electric Membership Cooperative near Jackson, North Carolina, if the distances from Buggs Island to a normal delivery point were in the neighborhood of 150 miles?

A. Distance is not the determining factor.

Q. It would be a very important factor, would it not?

A. It would be one of the very important factors; yes, sir.

Q. As I understand it, except for those within fairly close range to Buggs Island about which you spoke a moment ago, the answer to my question as to whether or not power could be delivered economically

to any particular cooperative listed in this Exhibit 43, would depend upon a study of the facts as to the particular case, would it not?

A. One would have to look more closely as the distance increased; yes, sir.

Q. Could you take this exhibit and of your own knowledge [1562] list for us those that you know power could be economically delivered to from Buggs Island at reasonable transmission distance?

A. It would take a pretty extensive study, sir. I wouldn't want to do it off-the-cuff.

Q. You have not that knowledge now, as I understand it?

A. Right.

Q. As a general rule, have you in mind any fairly clear rule-of-thumb, I will call it, within which it is your judgment that power may be economically delivered from Buggs Island to a cooperative?

A. That is the kind of a rule-of-thumb which is a mighty risky one. I haven't one, and I would look askance at one if it was handed me, because it is a pretty complicated problem.

CHIEF PRESIDING EXAMINER. Could you have one based upon mere distance alone?

The WITNESS. No, sir.

* * * * *

DIRECT EXAMINATION

[2440] By Mr. HANKIN:

Q. You say within "economical transmission distance." What would constitute an economical transmission distance in the Buggs Island-Roanoke Rapids area?

* * * * *

[2443] A. That depends on the amount of power to be transmitted. Power in quantities available at Buggs Island power plant can readily be transmitted to any point within the States [2444] of Virginia or North Carolina, and to the northern area of South Carolina.

* * * * *

[2448] Q. * * * My next question is this: That would mean transmission over distances of as much as 200 miles, is it not so?

A. That's right.

Q. Do you know of any instances where power is transmitted over distances of 200 miles, and have you had any connection with such transmission of power?

A. Yes, I know of a number of instances where power is transmitted at least 200 miles and I have had close association with some of these transmission lines.

Q. Please state some of those instances.

A. Probably the most outstanding group of transmission lines of this category are those transmitting power from the Hoover Power Plant on the Colorado

River near Las Vegas, Nevada, to Los Angeles and southern California in one general direction, and to Phoenix and Tucson, Arizona, in the other direction.

Another group are the transmission lines located in the Central Valley of California that are transmitting power from [2449] the Pitt River plants and the Shasta and Keswick power plants in northern California to the San Francisco Bay area.

Also from the Feather River plants in northern California to the Fresno area in the San Joaquin Valley, in California.

In the Pacific Northwest there are many transmission lines of this nature. For example, the lines from the Grand Coulee power plant to Seattle, Washington, the tie lines between the Grand Coulee Dam and the Bonneville Dam and power plants, and the transmission lines from Seattle to Vancouver, Washington.

Q. What is the range of distances of the lines you have mentioned?

A. Oh, these distances range from 200 to 275 miles.

Q. Do you expect that you may have to transmit power in the Buggs Island-Roanoke Rapids area in quantities and over distances which would be comparable to those in the areas you mentioned? If not, what would be the distances over which you expect the power may have to be transmitted?

A. No; not quite the distances nor the quantities. The distances would be somewhat less, in the order of 125 to 150 miles. In other words, with the development of plants in the Roanoke River Basin, it doesn't appear that transmission lines longer than 125 miles to 150 miles would be necessary.

APPENDIX III

WHEELING ARRANGEMENT OFFERED BY VIRGINIA ELECTRIC AND POWER COMPANY AS SET FORTH IN THE HEARING BEFORE THE INTERIOR DEPARTMENT SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS, HOUSE OF REPRESENTATIVES, EIGHTY-FIRST CONGRESS, SECOND SESSION, ON SECOND SUPPLEMENTAL APPROPRIATION BILL FOR 1951 (pp. 106–108).

VIRGINIA ELECTRIC & POWER CO.,
Richmond 9, Va., November 30, 1950.

MR. BEN W. CREIM,
Administrator, Southeastern Power Administration (SEPA),
Elberton, Ga.

DEAR MR. CREIM: Since the conference which we had with you in my office last July in regard to the proposal which we then discussed with respect to a contract covering the transmission over our company's transmission system of Buggs Island power for the account of United States of America, we have been giving careful consideration to the matters which we then discussed. We have also reviewed the several contracts which the Department of the Interior has recently entered into for the sale and transmission of surplus power from Government hydro projects, including the contract with the Georgia Power Co., as to the sale of power from the Altoona Dam, the Texas Power & Light Co. contract,

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the contract with Public Service Co. of Oklahoma, and the contract with Public Service Co. of Colorado, and we now desire to submit to you the following proposal regarding Buggs Island power.

Virginia Electric & Power Co. (VEPCO) is willing and offers to negotiate with the United States of America, through the SEPA, a contract based in principle on the points outlined in the attached memorandum, under which VEPCO will undertake (1) to transmit over its system all power and energy developed at Buggs Island to the Government's preferred customers located in VEPCO's service area, (2) to transmit and deliver to the system of Carolina Power & Light Co. (C. P. & L.) all such power and energy from Buggs Island as may be allocated by the Government for sale to C. P. & L. and for transmittal to preferred customers in C. P. & L.'s service area, [5965] (3) to purchase from the Government all the remaining power and energy generated at Buggs Island, (4) to construct such additional lines in our service area as may be necessary to accomplish the above undertakings, (5) to cooperate with the Government in obtaining the most economic and efficient operation of Buggs Island by supplying the energy required to firm up the peaking capacity of Buggs Island and coordinating the operation of Buggs Island with the VEPCO system, and (6) to supply, within the reasonable limits of its ability to do so, to the Government reserve power requirements for use by the Government during emergencies and scheduled outages of the generating facilities at Buggs Island.

We are convinced that such an arrangement will fully satisfy the requirements of the Flood Control Act; it will enable all preferred customers of the Government within the above area to obtain power from Buggs Island at a cost which will be less than that at which this power could otherwise be delivered to them; it will produce the most effieient and economic operation of the electric facilities installed at Buggs Island project: it will eliminate all necessity for the investment by the Government of money in a transmission system; and it will effect great savings of manpower and of critical materials which are already under restriction, objectives which we believe should be conclusive in the dangers our country is now facing.

We are ready to meet with you at your convenience to discuss this proposal and to undertake to work out such terms and conditions as may be necessary or appropriate to enable us to reach a mutually satisfactory arrangement.

Very truly yours,

J. G. HOLTZCLAW, *President.*

[5966] MEMORANDUM

Outline of Principal Features to be Incorporated in a Contract Between Southeastern Power Administration and Virginia Electric & Power Co.

Definitions

(a) *Dependable hydro capacity.*—90,000 kw., as shown in Appendix VI, Definite Project Report on

Buggs Island Reservoir, prepared in the U. S. Engineers Office, Norfolk, Virginia, February 1, 1946.

(b) *Excess hydro capacity.*—Capacity in excess of dependable hydro capacity as may be available from time to time.

(c) *Preference customer.*—Preference customer of Government, as provided for in Section 5 of the Flood Control Act of 1944.

(d) *Monthly maximum demand.*—The highest average kw. load measured over any period of thirty consecutive minutes, except that for unusually fluctuating large loads, such period, at VEPCO's option after notice, may be reasonably shortened.

(e) *On-peak.*—The hours are from 7:00 A. M. to 10:00 P. M., Mondays through Saturdays, except all hours during New Year's Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day.

(f) *Off-peak hours.*—All hours except on-peak hours.

(g) *VEPCO.*—Virginia Electric and Power Company.

(h) *C. P. & L.*—Carolina Power and Light Company.

Proposal

1. VEPCO will connect its lines at Buggs Island to the 110 kv. switch structure of Government's Buggs Island Hydro Generating Station and will construct such additional lines as may be necessary to transmit the entire output of the Buggs Island development into and through the system of VEPCO and/or into that of C. P. & L. in accordance with the terms of this proposal.

2. VEPCO will transmit Buggs Island power, for Government's account, to Preference Customers having a monthly maximum demand of 500 kw. or more at any one delivery point on VEPCO's transmission system, and likewise, will transmit Buggs Island power to all electric cooperative customers of Government having a monthly maximum demand of 500 kw. or more at any new delivery point on VEPCO's high voltage (22 kv., 33 kv., and 44 kv.) distribution lines and to those electric cooperative customers of Government, without any [5967] limit as to monthly maximum demand, at delivery points presently served by VEPCO or which it has proposed to serve; provided that the "Scheduled Capacity For Preference Customers," as defined in paragraph 3, for all such delivery points in any month shall not be greater than the portion of the dependable capacity being currently made available to VEPCO from Buggs Island for that purpose.

3. Government will supply the transmission losses and compensate VEPCO for the service of transmitting power and energy over VEPCO's lines to Preference Customers by making available each month to VEPCO for scheduling by its system operators, capacity (referred to herein as "Scheduled Capacity For Preference Customers") at Buggs Island in an amount equal to the sum of:

(a) 1.22 multiplied by the sum of the monthly maximum demands of Preference Customers within a 50-mile radius of Buggs Island.

(b) 1.42 multiplied by the sum of the monthly maximum demands of Preference Customers between

a radius of 50 miles and a radius of 100 miles of Buggs Island.

(c) 1.62 multiplied by the sum of the monthly maximum demands of Preference Customers between a radius of 100 miles and a radius of 150 miles of Buggs Island.

(d) 1.82 multiplied by the sum of the monthly maximum demands of Preference Customers between a radius of 150 miles and a radius of 200 miles of Buggs Island;

and by making available each month to VEPCO at Buggs Island, in conjunction with the above amount of capacity, energy in an amount equal to the sum of—

(a) 1.22 multiplied by the total energy delivered by VEPCO to Preference Customers within a 50-mile radius of Buggs Island.

(b) 1.42 multiplied by the total energy delivered by VEPCO to Preference Customers within a radius of 50 miles and a radius of 100 miles of Buggs Island.

(c) 1.62 multiplied by the total energy delivered by VEPCO to Preference Customers between a radius of 100 miles and a radius of 150 miles of Buggs Island.

(d) 1.82 multiplied by the total energy delivered by VEPCO to Preference Customers between a radius of 150 miles and a radius of 200 miles of Buggs Island.

[5968] 4. VEPCO will purchase all or any part of the dependable capacity and the energy from Buggs Island, as may be limited in this paragraph and in

paragraph 5 hereof, made available to it by Government, and will pay therefor as follows:

$1.06 per kw. per month.

4.0 mills per kw.-hr. for the first 200 kw.-hr. received during the on-peak hours of each month per kw. of capacity purchased under this paragraph.

3.0 mills per kw.-hr. received during the on-peak hours of each month in excess of the above amount.

2.0 mills per kw.-hr. received during the off-peak hours of each month to the extent that such energy can be economically utilized by VEPCO.

Government may withdraw dependable capacity and a proportionate part of the energy, previously allocated to and accepted by VEPCO, at a rate not to exceed 1,000 kw. per calendar month by giving VEPCO advance notice of a number of months equal to one month for each 1,000 kw. of such withdrawal; provided, such rate of withdrawal at Government's option, may be increased to permit Government to withdraw all or any part of such capacity and energy by giving three year's advance notice.

5. Government, in order to conserve water as in its sole opinion may be necessary or advisable, may limit the energy made available to VEPCO to less than that required to be supplied under paragraphs 3 and 4 hereof in any month but, in any event, Government shall make sufficient energy available so that both the "Scheduled Capacity For Preference Customers," as provided for in paragraph 3, and capacity purchased by VEPCO, as provided for in paragraph 4, shall be dependable in carrying the combined system load of VEPCO and Preference Customers when used in con-

junction with the reliable, efficient, and fully coordinated operation of all of VEPCO's generating facilities; provided, however, that the energy in kilowatt-hours made available shall not be less, in any month, than 150 multiplied by the sum in kilowatts of the "Scheduled Capacity For Preference Customers," in said paragraph 3 and the capacity purchased by VEPCO in said paragraph 4; and provided further, that such energy made available in any contract year shall not be less than 2,400 multiplied by the sum in kilowatts of the average monthly "Scheduled Capacity For Preference Customers" and the capacity purchased by VEPCO. During any month when Government does not make available to VEPCO all of the energy due VEPCO for delivery to Preference Customers as provided in paragraph 3 hereof, Government shall pay VEPCO for the energy not made available to VEPCO at a rate equal to VEPCO's average fuel cost per kw.-hr. plus 1.0 mill per kw.-hr.

[5969] 6. VEPCO will purchase, from Government such excess capacity and energy available from Buggs Island as may be requested by VEPCO and mutually agreed upon for specified periods of time at a rate of 3.5 cents per kw. per day plus 4.0 mills per kilowatt-hour of on-peak energy.

7. VEPCO will purchase from Government such excess energy as Government may have available after the fulfillment of the provisions of paragraphs 3, 4, 5, and 6, at a rate of 3.0 mills per kilowatt-hour for all such energy received during on-peak hours and 2.0 mills per kilowatt-hour for all such energy received during the off-peak hours, to the extent that such on-

peak and off-peak energy can be economically utilized by VEPCO.

8. In order to provide adequate and dependable electric service to Preference Customers, VEPCO will build extensions (including any necessary substation equipment except the customer's substation at the delivery point) from its transmission system (and, for electric cooperatives, from its high voltage distribution lines) or make additions to and/or improvements in such extensions, to serve Preference Customers; provided that if in its judgment the cost of such extension, addition, or improvement should result in excessive financial burden to VEPCO, the applicable factors used in paragraph 3 shall be increased appropriately as may be determined by mutual agreement, and in the event the parties are unable to agree, VEPCO shall not be required to make the extension, addition, or improvement. If and when VEPCO makes use of any portion of an extension, addition, or improvement provided for in this paragraph which resulted in increased factors used in paragraph 3, for purposes other than to serve Preference Customers, such increased factors shall be reduced accordingly.

9. In order to permit the disposal of the full output of Buggs Island without Government having to provide a reserve for the outages of Government's generating equipment used for generation of power for Preference Customers served directly from VEPCO's system and for delivery of power to VEPCO for its own purposes, VEPCO will supply these reserve power requirements, within its ability to do so, during

emergency and scheduled outages of such Government's generating facilities. In turn, Government will supply to VEPCO, within its ability to do so, such capacity and energy as it has available, for similar emergencies and scheduled outages of VEPCO's facilities.

10. VEPCO will allow the use of its lines to transmit from Buggs Island to VEPCO's interconnections with C. P. & L. such power and energy as Government may require to be delivered to C. P. & L. for sale to C. P. & L. and/or for transmittal to Preference Customers in C. P. & L.'s service area. Government shall supply to VEPCO the capacity and energy losses resulting from such transmission over VEPCO's lines.

TESTIMONY OF MR. JESSEL

DIRECT EXAMINATION

* * * * * *

[618] Q. Have you given any consideration to the requirements under which the Buggs Island plant must be operated to give preference to municipalities and REA cooperatives?

A. Yes; we have given that brief consideration and have made an analysis of the power requirements of the entire area within economical transmission distance. As we look at it, it makes little difference who operates the Buggs Island project; that energy must be sold on the most economical basis or the water will not be fully utilized.

Q. What particular markets did you study?

A. We broke the market into a few definite groups. First, there are the large municipal loads and large municipal [619] power plants in the area. Second, there are a number of small municipal plants serving small loads which we grouped together for our study. We then set up the REA cooperatives and finally, the large public utility systems, namely, the Virginia Electric and Power Company and the combined system of the Carolina Power and Light Company and Tide Water Power Company.

In our opinion, the energy from both Buggs Island and Roanoke Rapids will be needed and can be ab-

sorbed by or before 1955. We, therefore, used that year for the purposes of our analysis.

* * * * *

CROSS-EXAMINATION

* * * * *

[800] Q. While we are on that subject, Doctor, did you have any hand in the preparation of the Power Market Survey, Southeastern Area, which has heretofore been referred to in evidence this morning?

A. Yes, sir; I supervised and wrote part of it.

Q. Did you collaborate on that part which projected the future requirements of the Virginia Electric and Power Company for the years 1955 and 1960 and 1970?

A. At the time those were made they met with my approval.

Q. You have testified that you are an expert and that you can sit here in Washington and take the experience of the past and tell better what is going to happen in the future than the people who are in the business themselves. Was that your experience when you made up this survey known as the Power Market Survey of the Southeastern Region?

A. I might say that in making that survey the economists of the country, including Commission economists, predicted a business recession extending from three to four years, and based on the economic data available to the staff they made an estimate of the economic picture. As it happened, the economists overlooked two essential points, one was the pent-up demand for household facilities like refrigerators, water heaters, washing machines. They also overlooked the fact that [801] to obtain such facilities

for the consumers manufacturing equipment was required which meant industrial load would be required.

Furthermore, I think in that report on page 83 or so, of that order, there is a pictorial record in graphic form showing a break between actual record and the first year of estimate where the engineers would not wish to predict the dip in the so-called economic cycle and projected the estimates assuming that they were correct.

Q. Well, whatever led you into the error, or whatever is responsible for the error, the fact is that you did make an error, did you not?

A. The whole industry made the same error, sir.

Q. I am not talking about the whole industry, I am talking about you.

A. Including public bodies, too.

Q. You made the error, did you not?

A. No, sir.

Q. Well, does this correctly represent the forecast of what has happened, this report?

A. There is no figure on there which shows what happened beyond the last point of record.

Q. You said you did not consult the Rural Electrification or the cooperatives. Did you consult the Secretary of the Interior as to any request that had been made on his office for [802] power from these dams?

A. I have not, sir.

* * * * * *

Exhibit 85

Generating capacity and estimated loads of potential customers for Roanoke River Basin power

Group	Capacity (kw.)	Estimated loads (—kw.)			
		1955	1958	1960	1979
Federal agencies	88,440	157,000	157,000	157,000	160,000
North Carolina municipalities	110,900	134,000	160,000	180,000	320,000
Virginia municipalities	[1] 35,760	58,000	70,000	78,000	140,000
Old Dominion Electric Cooperative	[2] 36,350	59,000	72,000	80,0000	140,000
Eastern North Carolina EMC	[3] 20,000	39,000	50,000	56,000	100,000
Total	291,450	447,000	509,000	551,000	860,000
Fuel capacity	277,250				
Existing fuel capacity	226,500				

[1] Includes 13,950 hydro capacity.

[2] Includes 30,700 kw. steam not yet constructed but for which funds are available, and 250 kw. hydro.

[3] Proposed capacity.

Exhibit 86

Capacity available from approved plan of Roanoke River Basin development to meet power requirements of preferred and other customers

Project	Installed capacity	Dependable capacity [1]	Dependable capacity at load
Phase A development:			
Buggs Island	204,000	170,000	
Philpott	14,000	9,000	
Total phase A	218,000	179,000	165,000
Phase B development:			
Gaston	54,000	54,000	
Roanoke Rapids	58,800	58,800	
Smith Mountain	33,000	25,000	
Added phase B	145,800	137,800	
Total phase B	363,800	316,800	291,000
Phase C development:			
Leesville	16,000	16,000	
Taber	10,000	10,000	
Melrose	34,500	34,500	
Randolph	24,000	20,000	
Stuart	9,000	7,000	
Schoolfield	24,000	20,000	
Added phase C	117,500	107,500	
Total phase C	481,300	424,300	390,000

[1] At minimum head.

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Exhibit 34

[3884] *Estimated operation of Buggs Island project for serving estimated 1955 composite load*

Most adverse water year

Assumption:

Hydroelectric power supply limited to that fixed by water available during most adverse flow conditions (1930).

Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Sources of Information
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1. Buggs Island project:														
2. Plant capability, 1,000 kw	95	105	106	108	108	108	108	108	106	104	95	90	90	(1)
3. Energy, million kw.-h	34	18	24	16	16	14	16	17	16	17	18	19	225	(1)
4. Municipal loads, large:														
5. Peak demand, 1,000 kw	57	55	52	51	51	51	52	55	60	63	68	68	68	(2)
6. Energy, million kw.-h	22	20	21	20	20	19	21	22	23	25	24	25	262	(2)
7. Municipal generation, large														
8. Kilowatt demand, 1,000 kw	42	40	32	31	31	36	42	45	50	53	53	53	53	(2)
9. Energy, million kw.-h	19	17	16	15	15	16	19	20	21	23	21	22	224	(2)
10. Portion of municipal loads supplied by														
11. Buggs Island:														
12. Peak demand, 1,000 kw	15	15	20	20	20	15	10	10	10	10	15	15	15	(2)
13. Energy, million kw.-h	3	3	5	5	5	3	2	2	2	2	3	3	38	(2)
14. Municipal loads, small:														
15. Peak demand, 1,000 kw	6	6	5	5	5	5	5	6	6	6	7	7	7	(2)
16. Energy, million kw.-h	2	2	2	2	2	2	2	2	2	3	3	3	27	(2)
17. R. E. A. cooperatives:														
18. Peak demand, 1,000 kw	14	13	11	10	11	11	11	12	13	14	14	15	15	(2)
19. Energy, million kw.-h	5	4	4	4	4	4	4	5	5	5	5	6	55	(2)
20. Buggs Island supply to municipals and REA														
21. coops:														
22. Peak demand, 1,000 kw	35	34	36	35	36	31	26	28	29	30	36	37	37	----
23. Energy, million kw.-h	10	9	11	11	11	9	8	9	9	10	11	12	120	----
24. Buggs Island supply for large electric														
25. systems.														
26. Plant capability, 1,000 kw	60	71	70	73	72	77	82	80	77	74	59	53	53	----
27. Energy, million kw.-h	24	9	13	5	5	5	8	8	7	7	7	7	105	----

[1] Data based on definite project report of Corps of Engineers, Department of the Army (1930–1931 flow period), dated 2/1/46.

[2] F. P. C. staff estimate.

Exhibit 35

[3885] *Estimated relation of power supply to load requirements for Virginia Electric & Power Co. for the year 1955*

Most adverse water year

Assumptions:

1. Hydroelectric power supply limited to that fixed by water available during most adverse flow conditions for assumed regulation of Buggs Island project.
2. Output of Roanoke Rapids project assumed to be used entirely on load of Virginia Electric & Power Co. (VEPCO).
3. Remainder of Buggs Island project output after first supplying assumed public system loads, to be used on the VEPCO load.

Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Source of information
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1. Load estimate:														
2. Peak demand, 1,000 kw	740	705	690	665	655	690	705	705	720	760	800	820	820	(1)
3. Energy, million kw.-h	363	313	339	321	327	333	351	351	353	373	363	379	4,166	(1)
4. Existing power supply:														
5. Hydroelectric:														
6. Dependable capacity, 1,000 kw	13	14	21	19	17	15	13	12	10	10	14	13	13	(2)
7. Energy, million kw.-h	11	14	20	15	11	10	8	8	5	3	5	6	116	(2)
8. Steam-electric: [4]														
9. Total capacity, 1,000 kw	749	749	735	735	720	720	686	686	686	740	749	749	------	------
10. Scheduled maintenance, 1,000 kw	0	70	70	64	58	62	14	22	0	29	31	0	------	(1)
11. Net supply for load, 1,000 kw	749	679	665	671	662	658	672	664	686	711	718	749	749	(1)
12. Usable energy, million kw.-h	341	299	310	313	304	298	319	315	318	347	321	336	3,821	(1)
13. Additional hydro power supply:														
14. Roanoke Rapids project:														
15. Dependable capacity, 1,000 kw	91	91	91	80	54	60	61	66	71	91	91	91	91	(2)
16. Peaking energy, million kw.-h	34	14	19	8	8	7	7	8	11	13	18	19	166	(1)
17. Off-peak energy, million kw.-h	1	1	1	2	2	3	3	3	2	2	1	1	22	(1)
18. Buggs Island project:														
19. Plant capability, 1,000 kw	60	71	70	73	72	77	82	80	77	74	59	53	------	(1)
20. Dependable capacity, 1,000 kw	60	60	40	24	24	26	42	39	30	60	59	53	53	(3)
21. Energy, million kw.-h	24	9	13	5	5	5	8	8	7	7	7	7	105	(1)
22. Net firm receipts:														
23. Capacity, 1,000 kw	5	5	5	5	5	5	5	5	5	5	5	5	5	(1)
24. Energy, million kw.-h	2	2	2	2	2	2	2	2	2	2	2	2	24	(1)
25. Estimated reserves:														
26. Capacity, 1,000 kw	110	105	105	100	100	105	105	105	110	115	120	120	120	(4)
27. Energy, million kw.-h	0	0	0	0	0	0	0	0	0	0	0	0	0	(5)
28. Total supply, net:														
29. Capacity, 1,000 kw	808	744	726	699	662	659	688	681	692	762	767	791	791	------
30. Energy, million kw.-h	413	339	365	345	332	325	347	344	345	374	354	371	4,254	------
31. *Surplus* (+), *additional needs* (−):														
32. Capacity, 1,000 kw	+68	+39	+36	+34	+7	−31	−17	−24	−28	+2	−33	−29	−29	------
33. Energy, million kw.-h	+50	+26	+26	+24	+5	−8	−4	−7	−8	+1	−9	−8	−44	------

[1] F. P. C. staff estimate. [2] F. P. C. Form No. 12 data adjusted by F. P. C. staff. [3] Based on load curve studies. [4] Estimated at 15 percent of monthly peak load and assumed to be all steam-electric. [5] No hydro energy allocated to reserves. [6] Includes scheduled additions.

Exhibit 36

[3886]

Estimated operation of Buggs Island project for Serving estimated 1955 composite load

Most adverse water year

Assumption:

Hydroelectric power supply limited to that fixed by water available during average flow year.

Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Sources of Information
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1. Buggs Island project:														
2. Plant capability, 1,000 kw	95	102	106	107	108	108	108	108	106	104	101	95	95	(1)
3. Energy, million kw.-h	29	27	31	33	40	27	32	30	42	44	44	31	410	(1)
4. Municipal loads, large:														
5. Peak demand, 1,000 kw	57	55	52	51	51	51	52	55	60	63	68	68	68	(2)
6. Energy, million kw.-h	22	20	21	20	20	19	21	22	23	25	24	25	262	(2)
7. Municipal generation, large:														
8. Kilowatt demand, 1,000 kw	42	32	22	19	19	19	20	25	33	39	48	48	48	(2)
9. Energy, million kw.-h	12	8	6	5	5	5	6	8	9	10	12	12	98	(2)
10. Portion of municipal loads supplied by														
11. Buggs Island:														
12. Peak demand, 1,000 kw	15	23	30	32	32	32	32	30	27	24	20	20	20	(2)
13. Energy, million kw.-h	10	12	15	15	15	14	15	14	14	15	12	13	164	(2)
14. Municipal loads, small:														
15. Peak demand, 1,000 kw	6	6	5	5	5	5	5	6	6	6	7	7	7	(2)
16. Energy, million kw.-h	2	2	2	2	2	2	2	2	2	3	3	3	27	(2)
17. REA cooperatives:														
18. Peak demand, 1,000 kw	14	13	11	10	11	11	11	12	13	14	14	15	15	(2)
19. Energy, million kw.-h	5	4	4	4	4	4	4	5	5	5	5	6	55	(2)
20. Buggs Island supply to municipals and REA														
21. Cooperatives:														
22. Peak demand, 1,000 kw	35	42	46	47	48	48	48	48	46	44	41	42	42	----------
23. Energy, million kw.-h	17	18	21	21	21	20	21	21	21	23	20	22	246	----------
24. Buggs Island supply for large electric sys-														
25. tems:														
26. Plant capability, 1,000 kw	60	60	60	60	60	60	60	60	60	60	60	53	53	----------
27. Energy, million kw.-h	12	9	10	12	19	7	11	9	21	21	24	9	164	----------

[1] Data based on definite project report of Corps of Engineers, Department of the Army, dated 2/1/46.

[2] F. P. C. staff estimate.

Exhibit 37

[3887] *Estimated relation of power supply to load requirements for Virginia Electric & Power Co. for the year 1955*

Average water year

Assumptions:

1. Hydroelectric power supply limited to that fixed by water available during an average water year for assumed regulation at Buggs Island project.
2. Output of Roanoke Rapids project assumed to be used entirely on the load of Virginia Electric & Power Co. (VEPCO).
3. Remainder of Buggs Island project outfit, after first supply assumed public system loads, to be used on the VEPCO load.

Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Source of information
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1. Load Estimate:														
2. Peak demand, 1,000 kw	740	705	690	665	655	690	705	705	720	760	800	820	820	(1)
3. Energy, Million kw.-h	363	313	339	321	327	333	351	351	353	373	363	379	4,166	(1)
4. Existing power supply:														
5. Hydroelectric:														
6. Dependable capacity, 1,000 kw	28	30	33	32	29	25	22	20	16	17	20	24	24	(3)
7. Energy, million kw.-h	19	19	23	21	20	16	15	14	11	12	13	17	200	(3)
8. Steam-electric:[6]														
9. Total capacity, 1,000 kw	749	749	735	735	720	720	686	686	686	740	749	749	749	(1)
10. Scheduled maintenance, 1,000 kw	0	70	70	64	58	62	14	22	29	31	0	0	------	(1)
11. Net supply for load, 1,000 kw	749	679	665	671	662	658	672	664	657	709	749	749	749	(1)
12. Usable energy, million kw.-h	367	298	316	329	325	309	329	326	286	309	288	322	3,804	------
13. Additional hydro power supply:														
14. Roanoke Rapids project:														
15. Dependable capacity, 1,000 kw	91	91	91	91	91	91	91	91	91	91	91	91	91	(3)
16. Peaking energy, million kw.-h	23	20	21	22	27	17	21	20	36	33	33	23	291	(1)
17. Off-peak energy, million kw.-h	1	1	1	2	2	2	2	2	1	1	1	1	17	(4)
18. Buggs Island project:														
19. Plant capability, 1,000 kw	60	60	60	60	60	60	60	60	60	60	60	53	53	(1)
20. Dependable capacity, 1,000 kw	60	60	48	60	60	45	60	60	60	60	60	53	53	(3)
21. Energy, million kw.-h	12	9	10	12	19	7	11	9	21	21	24	9	164	(1)
22. Net firm receipts:														
23. Capacity, 1,000 kw	5	5	5	5	5	5	5	5	5	5	5	5	5	(1)
24. Energy, million kw.-h	2	2	2	2	2	2	2	2	2	2	2	2	24	(1)
25. Estimated reserves:														
26. Capacity, 1,000 kw	110	105	105	100	100	105	105	105	110	115	120	120	120	(4)
27. Energy, million-kw.-h	0	0	0	0	0	0	0	0	0	0	0	0	0	(5)
28. Total supply, net:														
29. Capacity, 1,000 kw	823	760	737	759	747	719	745	735	719	767	805	802	------	------
30. Energy, million kw.-h	424	349	373	388	395	353	380	373	352	378	361	374	4,500	------
31. Surplus (+), additional needs (−):														
32. Capacity, 1,000 kw	+83	+55	+47	+94	+92	+29	+40	+30	−1	+7	−5	−18	−18	------
33. Energy, million kw.-h	+61	+36	+34	+67	+68	+20	+29	+22	−1	+5	−2	−5	−8	------

[1] F. P. C. staff estimate. [2] F. P. C. Form No. 12 data adjusted by F. P. C. staff. [3] Based on load curve studies. [4] Estimated at 15 percent of monthly peak load and assumed to be all steam-electric. [5] No hydro energy allocated to reserves. [6] Includes scheduled additions.

Exhibit 38

[3888] *Estimated relation of power supply to load requirements for combined systems of Carolina Power & Light Co. and Tide Water Power Co. for the year 1955*

Most adverse water year

Assumptions:
1. Hydroelectric power supply limited to that fixed by water available during most adverse flow conditions for assumed regulation at Buggs Island project.
2. Remainder of Buggs Island project, after first supplying assumed public system loads, to be used on combined load of Carolina Power & Light Co. and Tide Water Power Co.

Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Source of Information
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1. Load estimate:														
2. Peak demand, 1,000 kw	585	550	555	545	550	555	565	580	600	615	625	640	640	(1)
3. Energy, million kw.-h	273	232	263	250	261	251	255	275	275	292	283	285	2,195	(1)
4. Existing power supply:														
5. Hydroelectric, peaking:														
6. Dependable capacity, 1,000 kw	155	155	160	160	145	150	145	142	165	170	178	183	183	(2)
7. Energy, million kw.-h	51	46	51	47	43	33	25	19	25	27	28	31	426	(2)
8. Hydroelectric, Run-of-river:														
9. Dependable capacity, 1,000 kw	2	2	2	2	2	2	2	2	2	2	2	2	2	(3)
10. Energy, million kw.-h	1	1	1	1	1	1	1	1	1	1	1	1	12	(3)
11. Steam-electric:														
12. Total capacity, 1,000 kw	320	320	320	320	320	320	320	320	320	320	320	320	----	----
13. Scheduled maintenance, 1,000 kw	13	60	60	44	44	31	0	0	0	0	0	0	----	(1)
14. Net supply for load, 1,000 kw	307	260	260	276	276	289	320	320	320	320	320	320	320	(1)
15. Usable energy, million kw.-h	133	117	130	136	132	131	147	153	154	152	150	146	1,681	(1)
16. Additional hydro power supply:														
17. Buggs Island Project:														
18. Plant capability, 1,000 kw	60	71	70	73	72	77	82	80	77	74	59	53	----	(1)
19. Dependable capacity, 1,000 kw	60	50	53	35	35	45	45	40	40	40	50	53	53	(3)
20. Energy, million kw.-h	24	9	13	5	5	5	8	8	7	7	7	7	105	(1)
21. Net firm receipts:														
22. Hydroelectric capacity, 1,000 kw	61	88	96	90	78	61	61	61	77	77	77	77	77	(3)
23. Hydroelectric energy, million kw.-h	12	17	17	17	17	12	28	28	34	34	34	34	284	(4)
24. Steam-electric capacity, 1,000 kw	46	46	46	46	46	46	46	46	46	46	46	46	46	(4)
25. Steam-electric energy, million kw.-h	20	20	34	33	24	24	20	20	20	20	20	20	275	(1)
26. Off-peak steam-electric energy, kw.-h	0	0	0	0	3	12	3	6	6	14	10	6	57	(4)
27. Estimated reserves:														
28. Capacity, 1,000 kw	90	85	85	80	85	85	85	85	90	90	95	95	95	(5)
29. Energy, million kw.-h	0	0	0	0	0	0	0	0	0	0	0	0	0	(6)
30. Total supply, net:														
31. Capacity, 1,000 kw	541	516	532	529	497	508	534	526	560	563	578	586	586	----
32. Energy, million kw.-h	241	210	246	239	222	218	232	235	247	255	250	245	2,840	----
33. Surplus (+), additional needs (−):														
34. Capacity, 1,000 kw	−44	−34	−23	−16	−53	−47	−31	−54	−40	−50	−47	−54	−54	----
35. Energy, million kw.-h	−32	−22	−17	−11	−39	−33	−23	−40	−28	−37	−33	−40	−355	----

[1] F. P. C. staff estimate. [2] F. P. C. Form No. 12 data adjusted by F. P. C. staff. [3] Based on load curve studies. [4] Based on contracts filed with F. P. C.
[5] Estimated at 15 percent of monthly peak load and assumed to be all steam-electric. [6] No hydro energy allocated to reserves. [7] Includes scheduled additions.

Exhibit 56

[4074] *Past and estimated future electric power requirements of REA electric cooperatives in Virginia*

REA Cooperative	Source of power supply	1945		1946		1947		1948		Estimate for 1955	
		Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Central Virginia El. Coop. (29)	Purchased	3,278	949	4,042	1,138	5,049	1,445	6,725	1,893		
2. Mecklenburg El. Coop. (31)	Purchased	2,333	795	3,315	1,198	5,030	1,823	8,148	2,972		
3. Southside El. Coop. (27)	Purchased	4,633	1,416	5,797	1,795	8,226	2,835	13,351	3,169		
4. Subtotal (lines 1 to 3)		(10,244)	(3,160)	(13,154)	(4,131)	(18,305)	(6,103)	(28,224)	(8,034)	(53,000)	(14,400)
5. Virginia El. Coop. (22)	Purchased	5,356	1,380	6,282	1,764	8,290	2,388	11,386	3,096		
6. Community El. Coop. (37)	Purchased	1,799	561	2,264	765	2,364	998	3,579	1,088		
7. Subtotal—Cumulative (1.1 to 6)		(17,399)	(5,101)	(21,700)	(6,660)	(28,959)	(9,489)	(43,189)	(12,218)	(80,000)	(21,500)
8. Northern Neck El. Coop. (28)	Purchased	1,568	354	2,122	478	2,865	512	3,665	1,014		
9. Prince George El. Coop. (36)	Purchased	415	[1] 118	599	[1] 171	988	[1] 282	1,244	445		
10. BARC El. Coop.[3] (30)	Purchased	2,482	720	3,356	1,152	4,660	1,398	5,302	1,512		
11. Craig-Botetourt El. Coop. (2)[3]	Purchased	1,039	[1] 297	1,328	[1] 379	1,695	[1] 484	1,873	758		
12.	Generated							340	[1] 100		
13.	Total	1,039	[1] 297	1,328	[1] 379	1,695	484	2,213	[1] 858		
14. Shenandoah Valley El. Coop. (11)[4]	Purchased	383	[1] 300	560	432	2,620	476	2,208	[1] 560		
15.	Generated	6,233	1,600	8,615	1,968	8,571	2,324	12,568	[1] 3,140		
16.	Total	6,616	1,900	9,175	2,400	11,191	2,800	14,776	[1] 3,700		
17. Northern Piedmont El. Coop. (35)[5]	Purchased	1,432	384	1,902	516	2,796	807	4,142	1,064		
18.	Generated	472	[1] 159	443	[1] 153	353	[1] 92	1,970	[1] 680		
19.	Total	1,904	[1] 543	2,345	[1] 669	3,149	[1] 899	6,112	[1] 1,744		
20. Total Purchased	Undiversified	24,718	7,274	31,567	9,788	44,483	13,448	61,623	17,571		
21. Total Generated	Undiversified	6,705	1,759	9,058	2,121	8,924	2,416	14,878	3,920		
22. Total Power Supply	Undiversified	31,423	9,033	40,625	11,909	53,407	15,864	76,501	21,491		
23. Total Purchased	Diversified	24,718	7,100	31,567	9,500	44,483	12,600	61,623	17,100	115,000	31,300
24. Total Generated	Diversified	6,705	1,700	9,058	2,000	8,924	2,400	14,878	3,900	20,000	5,700
25. Total Power Supply	Diversified	31,423	8,800	40,625	11,500	53,407	15,000	76,501	21,000	135,000	37,000

[1] Estimated.
[2] Cooperative has a 335 kw. hydro generating station.
[3] Cooperative has 300 kw. of hydro generating capacity and 752 kw. of Diesel-electric generating capacity.
[4] Cooperative has 5,040 kw. of Diesel-electric generating capacity.
[5] Cooperative has 200 kw. of hydro generating capacity.

Exhibit 57.

[4075] *Past and estimated future electric power requirements of REA electric membership corporations in North Carolina*

REA Cooperative	Source of power supply	1945		1946		1947		1948		Estimate for 1955	
		Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)	Energy (1,000 kw.-h.)	Annual peak (kw.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Albermarle E. M. C. (66)	Purchased			118	225	772	388	1,481	535		
2. Roanoke E. M. C. (31)	Purchased	1,164	408	1,384	456	1,840	663	2,886	972		
3. Edgecombe-Martin E. M. C. (16)	Purchased	1,157	400	1,646	610	2,308	[1] 850	2,894	880		
4. Tri-County E. M. C. (50)	Purchased	1,148	434	1,376	486	2,110	912	3,675	1,544		
5. Wake E. M. C. (47)	Purchased	940	317	1,183	554	1,878	666	2,670	904		
6. Piedmont E. M. C. (32)	Purchased	828	255	976	323	1,480	579	2,206	758		
7. Four County E. M. C. (21)	Purchased	2,133	586	2,578	819	3,459	1,297	5,371	1,561		
8. Subtotal (lines 1 to 7)		(7,370)	(2,400)	(9,261)	(3,473)	(13,847)	(5,355)	(21,183)	(7,154)	(40,000)	(11,000)
9. Jones-Onslow E. M. C. (43)	Purchased	3,755	1,143	3,610	893	4,429	1,122	4,902	1,617		
10. Pitt-Greene E. M. C. (14)	Purchased	1,054	450	1,358	[1] 543	1,750	[1] 645	2,092	[1] 730		
11. Halifax E. M. C. (33)	Purchased	1,136	363	1,482	[1] 450	1,960	[1] 590	2,628	[1] 735		
12. Brunswick E. M. C. (40)	Purchased	1,835	501	2,539	775	3,289	888	4,472	1,182		
13. Lumbee River E. M. C. (51)	Purchased	1,306	470	1,709	543	2,561	766	4,044	1,381		
14. South River E. M. C. (52)	Purchased	1,139	339	1,478	581	2,537	899	4,470	1,892		
15. Carteret-Craven E. M. C. (55)	Purchased	2,258	483	1,216	433	1,421	433	1,793	520		
16. Pamlico-Beaufort E. M. C. (56)	Purchased	265	92	492	143	755	204	1,113	306		
17. Central E. M. C. (58)	Purchased			19	36	350	194	811	356		
18. Woodstock E. M. C. (59)	Purchased	173	[1] 51	341	[1] 102	654	[1] 200	1,034	[1] 310		
19. Total Purchased	Undiversified	20,291	6,292	23,505	7,972	33,553	11,296	48,542	16,183		
20. Total Purchased	Diversified	20,291	5,900	23,505	6,900	33,553	9,700	48,542	14,000	90,000	24,500

[1] Estimated.

Exhibit 58

[4076] *Estimated magnitude of REA cooperative system loads to utilize the entire output of Buggs Island project*

[Assuming REA coperative systems provide steam-electric plant support]

Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Source of Information
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
A. Most adverse water year:														
1. Buggs Island project:														
2. Plant capability, 1,000 kw	95	105	106	108	108	108	108	108	106	104	95	90	90	----------
3. Energy, million kw.-h	34	18	24	16	16	14	16	17	16	17	18	19	225	----------
4. Estimated load to fully utilize Buggs														
5. Island output:														
6. Peak demand, 1,000 kw	124	114	105	93	98	102	103	110	117	124	128	134	134	----------
7. Energy, million kw.-h	46	38	39	33	36	37	38	41	42	46	46	50	492	----------
8. Utilization of Buggs Island output:														
9. Dependable capacity, 1,000 kw	94	81	79	64	68	68	71	75	80	85	90	90	90	----------
10. Energy, million kw.-h	34	18	24	16	16	14	16	17	16	17	18	19	225	----------
11. Steam-electric plant support:														
12. Dependable capacity, 1,000 kw	30	33	26	29	30	34	32	35	39	39	39	44	44	----------
13. Energy, million kw.-h	12	20	15	17	20	23	22	24	26	29	28	31	267	----------
B. Average water year:														
14. Buggs Island project:														
15. Plant capability, 1,000 kw	95	102	106	107	108	108	108	108	106	104	101	95	95	----------
16. Energy, million kw.-h	29	27	31	33	40	27	32	30	42	44	44	31	410	----------
17. Utilization of Buggs Island output:														
18. Dependable capacity, 1,000 kw	95	97	94	93	98	88	94	95	106	104	101	95	95	----------
19. Energy, million kw.-h	29	27	31	33	36	27	32	30	41	44	44	31	405	----------
20. Steam-electric plant support:														
21. Dependable capacity, 1,000 kw	29	17	11	0	0	14	9	15	11	20	27	39	39	----------
22. Energy, million kw.-h	17	11	8	0	0	10	6	11	1	2	2	19	87	----------

TESTIMONY OF MR. JESSEL

DIRECT EXAMINATION

[622] Q. How would you classify the Buggs Island project hydroelectric generating station?

A. I would classify the Buggs Island project generating station to be a peaking plant.

* * * * *

Q. Dr. Jessel, in view of the fact that the Buggs Island generating station would be a peaking plant, would it be adapted to serving some higher load factor municipal and REA Cooperatives system loads?

A. Yes, sir; it could serve up to about 37,000 kw. and 120 million kilowatt hours of such loads during an adverse water year, as shown by figures on lines 22 and 23 of Exhibit 34.

Q. Assuming service to municipal and REA Cooperatives systems to the extent shown by figures on lines 22 and 23, Exhibit 34, how much Buggs Island project output would remain for disposal to other systems in the market area?

[623] A. 53,000 kilowatts of capacity and 105 million kilowatt hours during a most adverse year.

* * * * *

Q. How do you know whether the remaining portion of the Buggs Island project output during a most adverse water year, in the amount of 53,000 kilowatts and 105 million kilowatt hours, would be usable on the loads of large electric systems?

[624] A. This is developed by two other exhibits.

* * * * *

Mr. COSTELLO. Mr. Examiner, I ask that there be marked for identification as Exhibit No. 35, a one-page chart bearing the caption at the top, "Estimated Relation of Power Supply to Load Requirements for Virginia Electric and Power Company for the year 1955.".

CHIEF PRESIDING EXAMINER. It will be marked for identification as Exhibit No. 35.

(The chart referred to above was identified as Exhibit No. 35.)

* * * * *

[625] Q. Dr. Jessel, would you please state what Exhibit 35 presents?

A. Exhibit 35 presents the results of a study to determine the amount of dependable hydroelectric capacity that would be realized on the 1955 Virginia Electric and Power Company system load during a most adverse water year such as 1930 assuming installation of 91,000 kilowatts at the Roanoke Rapids project and supply of 53,000 kilowatts of assured peaking capacity and 105 million kilowatt-hours of energy from the Buggs Island project.

* * * * *

[626] Q. What would be the dependable capacity of the remaining portion of the Buggs Island project output, namely, 53,000 kilowatts and 105 million kilowatt-hours, assuming it to be used on the estimated 1955 load of the Virginia Electric and Power Company?

A. 53,000 kilowatts. As shown by the figure on line 20, column 14, the Buggs Island project would be dependable on the estimated Virginia Electric and Power Company 1955 load to the extent of its remaining assured peaking capacity.

Q. Dr. Jessel, does your study indicate that, if 37,000 kilowatts and 120 million kilowatt-hours of the most adverse water year output of the Buggs Island project were delivered to municipal and REA Cooperative electric systems, the remaining energy would be sufficient to make the peaking capacity of 53,000 kilowatts dependable on the Virginia Electric **[627]** and Power system load as estimated for 1955?

A. Yes, sir, it does, based on the distribution assumed in Exhibit 34.

Q. What would be the dependable capacity of the Roanoke Rapids project if its energy output were used exclusively to meet the entire needs of municipal and REA Cooperative system loads?

A. About 48,000 kilowatts, assuming a reasonable distribution of water flow.

* * * * *

[629] Q. I notice on line 26, column 14 of Exhibit 36 that the figure 53 is the same as that one line 26, column 14 of **[630]** Exhibit 34. Will you please explain why it is not greater for an average water year?

A. For purposes of my study it was assumed that the minimum amount of plant capability to be made available to the large electric systems would be constant regardless of the type of water year experienced. It should be noted, however, from figures in column

14, line 27 Exhibits 34 and 36, that about 164 million kilowatt-hours of energy would be made available in an average water year as compared to 105 million kilowatt-hours in a most adverse water year.

* * * * *

[632] Q. Would you tell us what Exhibit No. 38 presents?

A. Exhibit 38 presents the results of a study showing to what extent 53,000 kw. and 105 million kw-h. from the Buggs Island project might be used on the estimated combined 1955 system load of Carolina Power and Light Company and Tide Water Power Company.

* * * * *

[633] Q. What does your study show as reflected by Exhibit 38 with respect to the ability of the estimated 1955 load of the combined systems to utilize 53,000 kilowatts and 150 million kilowatt-hours from the Buggs Island project during a most adverse water year?

A. The amount of 105 million kw-h. if made available from the Buggs Island project during a most adverse water year would be about sufficient to realize a dependable capacity of 53,000 kw. from Buggs Island project on the estimated combined 1955 load of Carolina Power and Light Company and Tide Water Power Company.

Q. Would you refer now to the figure minus 54 in column 14, line 34, on Exhibit 38, and state what it means?

A. The figure minus 54 indicates that there will be an additional need for 54,000 kw. of new generating capacity to meet the estimated 1955 power requirements

of the combined [634] systems of Carolina Power and Light company and Tide Water Power Company after making full use of existing power supply including firm power receipts, 208,000 kw. of new steam-electric capacity, assumed to be available before 1955, and of 53,000 kilowatts from the Buggs Island project.

Q. Do I understand from your studies that either the Virginia Electric and Power Company or the combined systems of Carolina Power and Light Company and Tide Water Power Company could fully utilize 53,000 kw. from Buggs Island project by 1955, as dependable capacity?

A. Yes, sir, that is correct. Furthermore, an analysis of Exhibits 35 and 38 shows that the entire dependable capacity of 90,000 kw. at Buggs Island project and 91,000 kw. at Roanoke Rapids project could be utilized on the 1955 loads of Virginia Electric and Power Company, and Carolina Power and Light Company and Tide Water Power Company,

Q. Based on your studies as summarized by Exhibits 35 and 38, if up to 10 per cent of the output of the Roanoke Rapids project were delivered to REA Cooperative systems at about 42 per cent load factor in a year of most adverse stream flow, in addition to that you estimated from Buggs Island project, would there remain sufficient energy at the Roanoke Rapids project to make the remainder of the capacity at such project dependable on the 1955 load?

A. No, sir; based on the study which I have made, all of [635] remaining capacity of the Roanoke Rapids project would not be dependable on Virginia Electric and Power Company's estimated 1955 load.

[814] Q. On page 618 and 619 you related how you broke the market into definite groups, and you said that you set up the REA Cooperatives. You have already listed with us the names of the cooperatives. Did you arrive at that figure of 15,000 kw. and 55 million kilowatt-hours by considering only those six cooperatives in Virginia?

A. No. That was based, as I explained on direct regarding Exhibit 34—the study which was made was to first determine how large such load would be—in preparing Exhibit 34—to deliver the full requirements of a certain proportion of the REA Cooperatives and small municipal systems, and peaking requirements of the large municipal systems. As to the large electric systems—the power supply was limited by the remainder available from [815] Buggs Island, so that the energy remaining would be sufficiently large to make the capacity dependable on the large system load. Of course, if you assume—which I did not on this Exhibit 34—that the co-ops would have their own stand-by, there the figures would be different, but that is not the assumption that I made in my study. In other words, these figures are less than could have been served if stand-by capacity were provided.

* * * * *

Q. Now, if it should develop that the 1955 requirements of 17 North Carolina cooperatives, who may be interested in this matter, will be 40,000 kw. and

140 million kilowatt-hours, what effect does that have on the conclusion which you have drawn?

A. For purposes of these Exhibits it makes no difference, because these were predicated upon supplying the maximum amount to public bodies and still have enough remaining at Buggs Island to make that remaining capacity dependable on the large system load.

Q. In other words, you were sacrificing, then, the preference rights of the municipalities and the cooperatives in order to obtain the maximum capacity for power company load?

[816] A. No, because I made a separate study to show what the load would be if the public body load took all of the Buggs Island's capacity. In making these studies, you learn from experience how to make a minimum, a sufficient minimum number of studies to get the effect of the over-all range. I could have made 50 more studies, but I think the number I made are adequate for the purpose.

* * * * *

[819] Q. Further, on 622, you were asked:

> [820] In view of the fact that the Buggs Island generating station would be a peaking plant, would it be adapted to serving some higher load factor municipal and REA cooperatives system loads?

To which you replied:

> Yes, sir, it could serve up to about 37,000 kw. and 120 million kilowatt-hours of such loads during an adverse water year, as shown by figures on lines 22 and 23 of Exhibit 34.

How did you arrive at that conclusion?

A. As I tried to explain for the fourth time, Exhibit 34 is based upon trying to determine approximately the maximum amount of power, capacity and energy which would be delivered to municipal and REA systems on the assumption that the remaining energy at Buggs Island would be sufficient to make the remaining capacity dependable on a large-system load. It is a matter of trial and error, and it is not done with mirrors. It requires some study.

Q. On page 625, in testifying regarding Exhibit 35, you have assumed that there will be available 53,000 kilowatts to sell to the Virginia Electric & Power Company when on page 624 you testified that the dependable capacity at Buggs Island would be only about 55,000 kw. if all of the needs of the preferred customers are satisfied. How did you reconcile those two statements?

[821] A. If all of the output of the Buggs Island project were to be delivered to meet the entire requirements of REA and municipal systems, the amount of energy available would be in such amount as to make the capacity dependable to the extent of 55,000 kilowatts. Now, in Exhibits 34 and 35, there only 37,000 kilowatts and 120 million kilowatt-hours were supplied to public bodies, that is REA and municipal loads, and there would remain 53,000 kilowatts and 105 million kilowatt-hours which would be dependable on the Virginia Electric & Power Company. There are two separate considerations, one is

entire requirements and the other is a partial one for two types of loads.

* * * * *

Q. Throughout Exhibits 34 and 35, and on page 626, you assumed each peaking capacity of energy would be sold to the Virginia Electric and Power Company at Buggs Island.

A. I didn't assume it was sold. I did not pretend to tell how it should be marketed, but I wanted to show that capacity was dependable.

Q. Taking your version of it, then. Now, on Exhibit 34 you show the estimated load of 53,000 kw. and 105 million kilowatt hours of energy as representing the demand of the large electric systems on Buggs Island project. What is the minimum amount of energy which would be needed by the company to make [822] the 53,000 kw. dependable on the type of load of the Virginia Electric and Power Company system?

A. With or without Roanoke Rapids?

Q. Let's take it either way, and both ways.

A. With Roanoke Rapids in the picture, the 53,000 kilowatts is dependable with energy of 105 million. Now, if you go along to Exhibit 35, line 32—Exhibit 35—beginning in June and running through December, the monthly variations are indicated as minus 31, which is for June; July, minus 17; August, minus 24; September, minus 28; October, plus 2; November, minus 39, and minus 29 for December. So the amount of energy——

Mr. GATCHELL. You misspoke the one for November.

The WITNESS. I mean 33. In making a slight readjustment in the pond you could even go to minus 29 flat during the dry months. You could hedge that, but that is about as far as I can go. That is about enough! You may have a few kilowatts left over.

* * * * * *

[823] Q. Turn to page 630, where you say:

> For purposes of my study it was assumed that the minimum amount of plant capability to be made available to the large electric systems would be constant regardless of the type of water year experienced.

Does this mean that you have assumed that the companies' needs must be taken care of first, and that the preferred customers are to get what is left?

A. Contrary-wise. I assumed that the maximum benefits would go to the preferred customers in my study.

Q. Why did you phrase it that way, then?

A. It was probably unfortunate phrasing, but it is just the other way around. The figures show that in the exhibit.

Q. The statement does not really reflect the true situation?

[824] A. Not in this situation; no.

* * * * * *

[826] By Mr. WHITEHEAD:

Q. How did you arrive at the conclusion that between the municipal and electric co-ops in an adverse year are allowed only 37,000 kw., whereas in a normal

year they are allowed 42,000 kw.—that they get more in the adverse year than they do in the normal year? Tell us that.

A. I didn't say that.

Q. What did you say?

A. I said that the figures on Exhibit 34 reflect what approximates the maximum amount of delivery to REA and municipal systems, and still have remaining sufficient energy to make the remaining capacity at Buggs Island dependable on the large system load.

Q. Assuming that to be your approach to it, why did you go and take the dependable capacity of 42 which you assigned to them in an average year, and reduce it to 37 in an adverse year and, at the same time, maintain 53,000 for the Virginia Electric and Power Company in both an adverse and a normal stream flow year?

A. I might explain it this way: That in an adverse year, the dependable peak capacity is that available in December of the year. That is when the peak load occurs in my estimate for the large systems and the REA system and the small and large municipal systems. Now, in making the low-year study, [827] I tried to determine the maximum delivery to public systems, and still make the remainder dependable on the large systems. I could have done one of two things: I could have said, "No, the municipals have 37,000 and the large systems 53,000. I am going to have 5,000 kilowatts more than in a dry year. Let me split that—give two to one and three to the other." I could have made it 39 or 37 into the Municipal

and REA and 55 or 56 to the large systems. I said, "No, I will be conservative and provide all the benefits in an average year—nine out of ten—to the public bodies."

Q. By reducing the amount they could get?

A. By increasing it in those years.

Q. Okay.

Now, turn to page 635. You state that if the United States were to market Buggs Island's and Roanoke Rapids' output, only 32,000 kw. would be available to preferred customers. If the remaining capacity were to be dependable to the large electric systems, shouldn't your analysis be on the basis that you first determine the needs of the preferred customers in the aggregate, and then determine what the remainder should be to go to private power companies?

A. For purposes of this study, as I mentioned, it was assumed that all the requirements would be met from these projects which have no steam stand-by. Then, if the projects on this system are to realize their full potentials as to revenues; in other words, if they were to be fully dependable after meeting certain [828] municipal and REA loads, the allocation between the large systems and municipal and REA systems was cut to 32,000 because above that point, not much above it, a few per cent, the remaining capacity would not be dependable on the large load. However, I did make a study, as I said. I took Buggs Island alone and for purpose of the study I allocated it to public agency and REA load to see how big a

system you would have to have to utilize one of the two projects. I think I covered the whole range of markets to such parties.

* * * * *

[839] By Mr. HANKIN:

Q. Mr. Jessel, will you refer to Exhibit 43 just marked for identification, and will you tell us what will be the demand in 1955 of the cooperatives?

A. This exhibit 43 shows as the sum of two figures, a kilowatt demand of 98,000 kilowatts.

Q. And an annual kw-h. requirement of how much?

A. This exhibit shows 374 million kilowatt-hours.

Q. Now, if you add to that the amount you have shown for the municipalities, which I believe is a total of 22,000 kilowatts and 65,000 kw-h.——

A. 65 million, I believe it was.

Q. Yes; 65 million kw-h., how much will you get?

A. Adding those figures, the arithmetical sum would be 120,000 kilowatts and 439 million kilowatt-hours.

Q. Now, if that amount of power and energy is sold to public bodies and to cooperatives, how much will there be left for the Virginia Electric and Power Company from the Buggs Island project?

[840] A. That amount of power could not be sold.

Q. What do your mean, it cannot be sold?

A. Of this total of 120,000 kilowatts, at least one-third has to be steam capacity, so Buggs Island does not, to my knowledge, have any steam capacity authorized as part of the project.

Q. Suppose there is steam capacity available that would utilize that amount of power, how much will

there be left from the Buggs Island project for the Virginia Electric and Power Company?

A. I don't get your question. Would you mind repeating it?

* * * * *

The WITNESS. 19,000 kilowatts.

By Mr. HANKIN:

Q. How did you arrive at that figure?

A. For the 98,000 kilowatts of REA load, I assumed that approximately one kilowatt of steam would be provided for every two kilowatts of hydro sold——

Q. Now, just a second. Have you read this Exhibit 43?

A. I have read it now.

Q. Now will you answer my question?

A. Your question, as I remember, was if they had their own steam capacity.

[841] Q. No; if considering, as the Administrator says, that the REA's will require that much power, that is, 98,000 kilowatts, as he says, "from Roanoke River hydro developments", and in addition to that the municipalities will require as you estimate it, 22,000 kilowatts, how many kilowatts will there be left for the Virginia Electric and Power Company?

A. This says, "the 1955 requirements of the borrowers." That is the total requirements, as I read that.

Q. Now, will you read the rest of the sentence and convince yourself otherwise?

A. "Who have made application for power from the Roanoke River hydro developments." That to me, as I interpret this, and I only interpret it since I have had it, is that 98,000 kilowatts is the total requirement of these prospective borrowers.

A. From what? "From Roanoke River hydro developments."

A. "From Roanoke River hydro developments," who have made application for power from. That does not mean the same to me, sir. That means that the cooperatives who have made application will have a total load of 98,000 kilowatts.

Q. Now, let me ask you this question: Suppose the requirement from these hydro projects is 98,000 kw., and in addition to that the municipalities require 22,000 kw., so that you have a total of 120,000 kw., how much of Buggs Island power will be left for the Virginia Electric and Power Company?

* * * * *

[842] The WITNESS. How much energy goes with that? The capacity figure means nothing at all to me.

* * * * *

By Mr. HANKIN:

Q. Why is it that when it came to figuring the requirements of the Virginia Electric and Power Company on Exhibit 34, you made a simple arithmetical computation, 90 minus 37 equals 53, but when it comes to figuring the same thing with [843] the requirements of the REA cooperatives as stated by the Administrator of the Rural Electrification Administration, there is so much argument about it?

* * * * *

The WITNESS. Unless I know how much energy he associates with that capacity, I cannot answer that question.

By Mr. HANKIN:

Q. The energy is right there on that same sheet, Mr. Witness.

A. I would like to call your attention, if I may, to show the difficulty I am having. That energy and that capacity as shown on this exhibit correspond to a load factor of approximately 43½ per cent, which is the total requirement of the REA load. That I can answer, I think. But when you give me a figure of capacity and no energy, and make an assumption therefrom, I don't know what to assume.

Q. Did you have to assume the load of the Virginia Electric and Power Company in order to deduct 37 from 90?

A. No; but in making that deduction I have to make one further step to see whether the energy going with that 53,000 [844] kilowatts was in sufficient amount to make it dependable on the load. In other words, whether that capacity could return full capacity value for the capacity at the Buggs Island project.

Q. Well, let's assume the load factor of 43 per cent that you have stated, what would be left for the Virginia Electric and Power Company?

A. I said 19,000 kilowatts.

Q. How do you arrive at that?

A. I took the 98,000 kilowatts and from a study I made as to steam support required to back up Buggs Island, it requires one kilowatt of steam for two kilo-

watts, roughly, of hydro. So, to meet the total load of 98,000 kilowatts, you need 32,000 kilowatts of steam and 66,000 kilowatts of hydro.

Q. But I asked you a different question. I asked you to assume, as the Administrator of the REA has assumed, that the requirement of hydro power itself will be 98,000 kilowatts.

* * * * *

[845] CHIEF PRESIDING EXAMINER. I think I will sustain the objection.

* * * * *

By Mr. HANKIN:

Q. Will you answer the same question as to the amount of energy: Suppose that the REA cooperatives get 374,000,000 kw-h. and the municipalities get 65 million kw-h., making a total of 439 million kw-h., what will be left for the Virginia Electric and Power Company?

* * * * *

[846] The WITNESS. I would have to do quite a bit of computation, sir. In other words, to make my answer, I would have to take the steam on the base and run it on a load curve and see what energy and capacity would be utilized from Buggs Island, and that is not a simple matter.

By Mr. HANKIN:

Q. Is it not true, Mr. Witness, that there wouldn't be anything left for the Virginia Electric and Power Company and that the municipalities and the cooperatives will need some power from Roanoke Rapids?

A. No, sir, not from the figures I see here.

Q. Haven't you all along assumed that the municipalities and cooperatives will supply the steam necessary to absorb so much hydro?

A. I have made my studies on two bases, assuming no steam and with steam.

Q. Now, assuming with no steam, what would be the result?

A. The energy available at Buggs Island, based on that—I think I have given the answer in my testimony already—I think I said about 48,000 kilowatts.

Q. Haven't you assumed in this entire testimony, Mr. Jessel, that it doesn't make any difference what the REA Administrator says is needed by the REA cooperatives, it doesn't make any difference what the Secretary of the Interior says may be needed to market this power so as to give preference to [847] public bodies and cooperatives, you have assumed that a great part of this power will go to the Virginia Electric and Power Company and whatever may be left over, to the public bodies and cooperatives?

A. No, sir, I have made studies on two bases, one, to see what the maximum amount of power is that could go to municipal and REA systems, assuming no stand-by capacity, and two, assuming that they market all Buggs Island to public bodies.

Q. Then why didn't you take the trouble to find out how much the cooperatives and public bodies will actually need?

A. The amount of load required to utilize all of Buggs Island is 134,000 kilowatts and 492 million kilowatt-hours. I also considered the James and

the Rappahannock Basin projects. Those are so large they did not require any further consideration.

Q. Now, will you answer my question?

A. I answered your question.

* * * * *

[861] Redirect examination by Mr. GATCHELL:

* * * * *

Q. You kept referring all the time to the figure of 37,000 kilowatts of capacity that could be supplied during a year of adverse stream flow to municipals and REA's, and a balance of 53,000 that would be dependable on the load of [862] the Virginia Electric and Power. Why do you keep talking about dependable?

A. In utility practice dependable capacity is that capacity which can be called upon for carrying load and it has associated with it full capacity value. In other words, should that capacity be not available it would be substituted for by steam electric capacity and would have like value, as to the capacity component.

Q. If it is not dependable does it have the same value?

A. No, sir; practically nothing.

Q. It has practically no value if it is not dependable?

A. Yes, sir, because if it is not dependable it is not available when required. That in turn means that the system utilizing that capacity would have to provide the full amount required when the hydro is not available, so it would be unfair to give it any appreciable value, because the investment has to be duplicated.

Q. Does that mean, as applied to the Buggs Island plant, that if the 53,000 kilowatts of capacity which you describe as dependable, were not dependable, would that reduce the income from power at that project?

A. It certainly would.

* * * * *

DIRECT EXAMINATION

[2452] Q. How do you intend to market the power from Buggs Island in relation to the types of customers?

[2453] A. As I stated with reference to my responsibilities generally, we are going to give preference to public bodies and cooperatives in the purchase of this power. It will be my endeavor to see to it that all of the power produced at Buggs Island will be made available to preference agencies in quantities sufficient to meet their needs. If there is any power available after the needs of the preferred customers have been met, we shall endeavor to market that power to the most readily accessible customers, including the privately owned power companies.

Q. In order to make the most economical use of the Buggs Island power, would it not be necessary to sell large blocks of that power to the privately owned utilities which have a large amount of steam support?

A. Not necessarily. Generally speaking, the integration of thermally-produced power with that produced at hydroelectric plants is very desirable. It is not, however, mandatory. The specific characteristics of the load served are generally as important as the availability of thermally-produced power.

Q. Are the privately owned utilities in the area the only source of thermally-produced power with which

you could integrate to firm up the power at Buggs Island?

A. No; there is a sizeable quantity of steam and Diesel power capacity available in Virginia and North Carolina, owned by preference agencies and federal establishments.

[2454] Q. Have you caused to be prepared an exhibit showing the amount of steam and diesel power available in the area of which you may be able to avail yourself?

A. I have.

Q. Is the exhibit marked 85, for identification, the one you had prepared?

A. It is.

Q. Will you please explain this exhibit?

A. This exhibit shows that the presently existing steam and diesel capacity in the area owned by preferred customers is approximately 226,000 kilowatts and that after the completion of definitely planned plants, there will be some 277,000 kilowatts, of capacity installed.

Q. While you are explaining this exhibit, will you please also state what else this exhibit shows?

A. It contains our estimate of the power requirements of Federal agencies, of Virginia and North Carolina municipalities, and of the cooperatives in Virginia and North Carolina for the years 1955, 1958, and 1960, and a forecast as to the load and power requirements for the year 1970.

Q. I notice that while on this exhibit you show a growth in the power requirements of the Virginia and

North Carolina public bodies, and the Virginia and North Carolina cooperatives, your figures for the Federal agencies remain practically constant. Why is that so?

[2455] A. In our studies, we assumed a peacetime status for the Nation, and to be conservative in our estimates we have assumed no increase in the present activities at the Federal establishments which are a part of or related to the Department of Defense.

Q. What would happen in case of national emergency?

A. Oh, the loads of all agencies, Federal and non-Federal, would increase materially.

Q. Are these the power requirements, shown in this exhibit, the loads which you may have to meet in the years indicated, from projects in the Roanoke River basin?

A. The exhibit shows our estimates of what in the years indicated the demand for power will be on the part of these preferred customers upon the Southeastern Power Administration for power service from the Roanoke River basin.

* * * * *

CROSS-EXAMINATION

By Mr. MOORE:

* * * * *

[2621] Q. Mr. Creim, don't you agree that any load estimates beyond 1955 would be highly speculative?

A. Beyond '55?

Q. Yes.

A. Oh, no. '55?

Q. Yes.

A. As a utility executive, if I only stopped my projection for five years?

Q. Yes.

A. No; I would say it is mandatory on the part of good [2622] management to have some estimating and load forecasts beyond that. I see no speculation in it. There is nothing speculative in the electric industry.

Q. How about after 1960, after ten years?

A. After 1960, the only question in my mind is whether we are going to continue that same type of load growth rate that we are in now, or whether we are going to dip into something even more spiral. There is a relationship between electric load growth and the development of the initiative of the American engineer, and that has been pyramiding and compounding for the last 100 years.

These estimates up until 1970, in my judgment are extremely conservative. It may well be that we will go into a new kind of an age, I don't know. When we moved from the horse and wagon age to the automobile, and then the mechanical age, these things happen. Maybe by 1970 electricity may be as obsolete as the kerosene lamp; that well could be; but I think the reverse is going to take place. I think the demands for energy, the demands for energy are directly proportional to the intelligence of man. I don't want to appear egotistical sitting here, but I think we engineers are doing a fair job in the utilization of electricity, and I see no reason to speculate at this time that that is all going to stop five years from now.

TESTIMONY OF MR. JESSEL

DIRECT EXAMINATION

* * * * *

[635] Q. If the United States were to market the Buggs Island and Roanoke Rapids project output, what proportion of such output could be delivered to REA and municipal systems, assuming the meeting of their full requirements?

A. About 32,000 kilowatts from both projects if the remaining capacity is to be dependable on the large electric systems.

* * * * *

[769] Cross-examination by Mr. COHN:

Q. Dr. Jessel, in your testimony and in certain of the exhibits prepared by you, you indicated that in analyzing the power requirements of the area within economical transmission distance of Buggs Island, you broke the market into certain groups, including a group of large municipalities in the area. Could you tell us the municipalities which comprise that group, that is, the group of large municipalities?

May I ask, first, are there a substantial number of such municipalities?

A. No; there are only seven.

Q. Would you name them?

A. City of Rocky Mount, North Carolina, Town of Wilson, North Carolina, Town of Tarboro, North

Carolina, Greenville, North Carolina, Kingston, North Carolina.

* * * * *

[770] Q. Were there no large municipalities in Virginia that you considered in this group?

A. The selection of "large" was in some measure determined by generating facilities also. I did not consider any in Virginia as falling in that category, although I do have the larger systems in Virginia of that type.

Q. Those in Virginia, I take it, were included in the smaller municipality group?

A. In the smaller municipalities.

Q. Would you give us those, please? Are they very extensive?

A. Not the ones I listed, no.

Q. Would you give us those, please?

A. Yes, sir.

The municipalities were the Town of Blackstone, the Town of Franklin, the Town of Wakefield, the Town of Edenton——

Mr. MOORE. That is North Carolina?

[771] The WITNESS. North Carolina. I did not indicate the states in all cases.

Elizabeth City, North Carolina; the Town of Enfield, the Town of Hertford, the Town of Robersonville, and the Town of Tarboro, partially, for the purchases to make a continuous record.

* * * * *

By Mr. COHN:

Q. Can you tell us the power requirements that you assumed for each of the municipalities you named in Virginia?

A. As of what period? As of '47, '48, or what year?

Q. Do you have it for 1950, estimated?

A. Not separately.

Q. Could you give it for 1949, please?

A. The '49 year has not expired yet, so I can't have '49.

Q. You do not have that separately?

A. Not separately.

Q. Could you give it for 1948?

[772] A. Blackstone, four million—I will give it here in hundreds of thousands of kilowatt-hours, just to make it simple. I have it all the way to the last place.

Blackstone, 1,200 kilowatts, annual demand; 4,830,000 kilowatt-hours.

Franklin, 1,696 kilowatts, 6,835,000 kilowatt-hours;

Wakefield, 210 kilowatts, 800,000 kilowatt-hours;

Edenton——

Q. Is Edenton in North Carolina?

A. I believe that is right.

Q. My question is directed only to the municipalities in Virginia.

A. I can check that.

Mr. MOORE. All the rest of them are in North Carolina, are they not?

The WITNESS. I believe they are.

CHIEF PRESIDING EXAMINER. Edenton is in North Carolina.

The WITNESS. That is right, all the rest are in North Carolina.

* * * * *

[774] By Mr. WHITEHEAD:

Q. Dr. Jessel, you have given us the figures for certain municipalities. Do you have the figures for the City of Danville, Virginia, which has its own municipal plant?

A. No, sir; I do not.

Q. How did you happen to omit that one?

A. The city of Danville is near the Philpott project and if it is to receive Roanoke Basin power that would be a more logical supply.

Q. Will you give us the approximate distance from Danville to Philpott and from Danville to Buggs Island?

A. I don't have a map here, sir; I wouldn't want to hazard a guess.

Q. Did you include the Town of Bedford, Virginia, which [775] has its own municipal plant?

A. I can check and see. I wanted to check and see how big it is, roughly, before I want to say what classification it is in.

Mr. WHITEHEAD. Mr. Examiner, I do not want to take the time of all of us. It is entirely agreeable for this gentleman to get this information during the noon recess and give it to us afterward.

The WITNESS. I have the size of the plant, if you want to know that.

Bedford has a plant of 970 kilowatts.

By Mr. WHITEHEAD:

Q. Did you include that in the list that you mentioned?

A. I am trying to to check and see if I have that. I considered it, but it is not included. I have my list of all the plants I considered, but I did not include the figures for them.

Q. Why did you not include the Town of Bedford, which is in the watershed of the Roanoke River?

A. I don't recall the reason right now, but I did have one at the time. I listed all the towns and cooperatives which I scanned through.

Q. Did you include the City of Martinsville, Virginia, located between Philpott and Danville?

A. No; I did not. I finally crossed that off.

Q. Why did you cross that out when that is on one of [776] the tributaries of the Roanoke River?

A. For two reasons: I considered, first, those which I classified as within economic transmission distance, but the second factor was that when I estimated large municipal loads, and the REA loads, the amount of load by '55 was so much in excess of the amount which turned out to be salable to them without any steam stand-by, that I just discarded the smaller ones.

Q. Well, you would not consider the City of Danville, which is far more populous than any other place you have mentioned as being so small that it could be treated as insignificant, did you?

A. Not Danville, I mentioned Danville in connection with Philpott.

Q. Did you discard Martinsville under like consideration?

A. In my exhibits only a limited amount of the total future estimated loads would be marketable from Buggs Island, assuming no steam support, and assuming complete requirements to be supplied by the Buggs Island project. Now, I do know how large that system is. In my experience in handling these types of loads, I do make adjustments for such systems. If you please, I will give you that figure, as long as you brought it up.

Martinsville has a 1,300-kilowatt hydro plant. It sold in 1948 ten million kilowatt-hours, of which it generated five.

Q. And what about the City of Danville, while you are on [777] the subject?

A. Danville has a 10,000-kilowatt hydro plant and 6,350-kilowatt steam. They generated 31 million kilowatt-hours in '48, and purchased approximately ten million.

Q. So that in addition to that, don't you know that Danville is building a new steam unit?

A. That would not be reported to us except in the annual report coming in within the next month or two.

Q. Now, you stated you discarded these that did not have steam plants and the showing is that Danville does have a steam plant. Then why did you discard it?

A. I did not disregard Danville. I said I considered it as within the marketing sphere of Philpott.

Q. Now turning to Philpott, what is the dependable capacity of that?

A. On what system load would you want to market it? It makes a difference.

Q. I am just asking you the dependable capacity of Philpott.

A. Your question has no meaning, sir, as phrased.

Q. It has no meaning?

A. No, sir.

Q. Can you tell us how many kilowatt-hours they can generate there?

A. I don't have those figures here, but they are at the [778] office.

Q. Can you tell us the dependable capacity for it, geared to the Appalachian Electric Power system, or a combination of both of them?

A. I would guess about 10,000 kilowatts, but I would want to check that.

Q. And yet you say you discarded Danville, because it was within the general radius of Philpott?

A. That's right. I did not consider it, rather than discarded it.

Q. Please turn to page 615 of the transcript. Off the record.

Now, Doctor, at any time if my questions are not plain do not hesitate to say so, and we will try to clarify them.

A. Okay, sir.

Q. You say, beginning at line 17, "I made an independent study of the estimated relation of power supply to load requirements of the Virginia Electric and Power Company to see to what extent the output of the Roanoke Rapids project could be utilized on the system load estimated for the year 1955."

Did you make a similar independent study to determine the extent to which the output of Roanoke Rapids project could be utilized to meet the requirements of the municipal and REA Cooperatives for the year 1955?

A. No, sir; that was not part of the application considera-[779]tion that I was asked to work up.

Q. In other words, your work was done before the REA Cooperatives and the municipalities were considered?

A. I don't recall the exact finishing date, but I will say I did study—the upstream project was under construction and I understand was due in service by 1952. I did not consider that the Roanoke Rapids project was under consideration as a potential source of supply to REA loads.

Q. Then are we to infer from that, Dr. Jessel, that you all just ruled out the municipalities and the REA's, when you began to consider the Roanoke Rapids project?

A. I wouldn't call it ruled out.

Q. Well, what would you call it?

A. I meant to say that the staff's function, at least our portion is, in each application to consider whether the application as proposed by the applicant is such that the output of the project can be utilized on the load of the applicant. We could study many combinations, but they do not always fall within the sphere of this type of preparation of testimony.

I did, however, study the Buggs Island project for such purpose to make sure that the monthly distribution of capacity, to the extent indicated in my ex-

hibits, and also assuming full utilization of Buggs Island for REA loads, would be a reasonable distribution.

[780] Q. But, Doctor, didn't you realize that one of the questions submitted by the Commission for consideration is whether Roanoke Rapids should be built by the government or by the applicant? You knew that, didn't you?

A. At the time I made my study, I don't recall whether that was a consideration or not.

Q. When did you complete your study?

A. I believe about ten days ago or more, I don't recall.

Q. Well, now——

A. Let me check that. Before the hearing began, the working sheets were ready for photostating a few days before the hearing began, as I recall it.

Q. And you did not know that whether or not the government should construct Roanoke Rapids was one of the difficult things in this case?

A. It may be. I wasn't here on the opening day of the argument, so I missed that point.

* * * * *

By Mr. WHITEHEAD:

Q. Now, Dr. Jessel, in the order of March 22, 1949, more [781] than 60 days ago, the Commission posed one of the questions, the question of whether the development of the Roanoke Rapids site should be undertaken by the United States itself. Did you have that question before you?

A. I don't remember, but I don't think that has any connection as to how it might be marketed by the Department of the Interior.

Q. Who requested you to make this study, what department or agency within the Commission?

A. The Bureau of Power chief assigned me to prepare the usual power market study for the application as filed.

Q. And nobody within this Commission asked you to make any study with reference to the system requirements of the municipalities and the REA cooperatives with reference to Roanoke Rapids?

A. That Association——

Q. Doctor, I don't want to be insistent, but I just ask you, if you can, to give me a direct and explicit answer to that question. I want to be entirely courteous with you.

A. I do not want to be reticent, but you are combining two factors. I must, of necessity, study private systems, municipal systems, REA systems, in the consideration for the area, because for one thing of the Buggs Island project coming in. I did study those systems, but I did not tie them in specifically to the Roanoke Rapids project.

[782] Q. Now, then, if you were to study the system and the Roanoke Rapids project, is the question now before the Commission for consideration, why didn't you tie it into that?

A. I know of no application for license by REA Co-ops.

Q. Well, don't you realize, Dr. Jessel, that if the government builds a dam the REA Co-ops and the municipalities have a preference on the power? You knew that, didn't you?

A. If they build which project?

Q. Roanoke Rapids, if the government builds it.

A. To the extent that the output is marketable, yes; I knew that.

Q. And you didn't take that at all into consideration?

A. Not in a direct manner, no.

Q. In other words, in working up your study, you had your mind fixed on the application and what you were endeavoring to do was to work out how this application would fit into the requirements of the Power Company in the public interest, is that right?

A. I studied the Roanoke Rapids project with respect to the marketability of its output on the Virginia Electric and Power Company's system.

Q. And that alone?

A. That specifically, yes.

Q. And that alone?

A. Well, I considered what the probability would be as [783] to steam support, if it were considered separately, but I made no studies of it.

Q. Well, I would ask you, that alone?

A. I don't understand your question, was that alone?

Q. You said you made it with reference to the output for the Virginia Electric and Power Company. Now, I ask you, did you make it with reference to that output alone?

A. My study included also the utilization of Buggs Island output, too.

Q. I am not talking about Buggs Island now, sir. I am asking you about Roanoke Rapids, and I am going to hold you right down to it.

A. With or without Buggs Island upstream? I think your question is indefinite.

Q. When you began to consider the output from Roanoke Rapids, did you take into consideration the requirements of the cooperatives and the municipalities?

A. I did, to the extent they were included in the Virginia Electric and Power Company system loads.

Q. And not otherwise?

A. Not otherwise.

Q. Thank you.

Now, then, turning again to page 613 of the transcript, you there stated:

> I also made a study of the probable markets for [784] Buggs Island project output to determine, among other things, the approximate monthly distribution of water releases from such project for use through the Roanoke Rapids project.

Did you make any study of the coordinated operation of both Buggs Island and Roanoke Rapids projects to determine to what extent to which the requirements of the REA Cooperatives could be met, allocating the residue to the requirements of VEPCO after allowance for municipal needs?

* * * * *

The WITNESS. Your question is not sufficiently clear in that as I did this. I first took the Buggs

Island project and saw what portion of its output could be marketable to municipalities and REA cooperatives to meet their full requirements, and then made a study in order to see what proportion of the remainder would be marketable in a large system.

That, of necessity, required the study of the two projects together because of the correlation of water flows and the amounts of energy month by month during the average and dry year periods.

Q. In other words, the coordination was merely incidental, you didn't make a study of the two systems combined as if they [785] were run under one authority and by one agency?

A. No; I did not assume complete coordination under one operating head.

Q. Now, Dr. Jessel, with the question before the Commission whether or not the United States should undertake the construction and operation of Roanoke Rapids, can you tell us why you didn't make a study of the coordinated operations of the two plants by one agency, in order that the Commission may have the full picture before it?

A. For two reasons: One, I have no knowledge of when Roanoke Rapids might be built. Two, my studies showed that to utilize Buggs Island alone with steam support would require a peak load on the REA system of about 134,000 kilowatts, and annual energy amounting to 492 million kilowatt-hours, which is a load much larger than that which I would consider for '55, and which would be way some time in the future. So the problem which was left was whether

or not Buggs Island alone or a combination could meet the needs.

The total size of power supply availability was such that it would be a long time before the output of both projects could be absorbed.

Q. Well, haven't you testified that the output of both Buggs Island and Roanoke Rapids can be absorbed?

A. I have so testified it could be absorbed in the area, yes.

Q. Then why do you raise the question which you now do [786] about the possibilities for the future?

A. For this reason, that your questions were directed to public loads. I assumed from your questions they would imply some steam stand-by to make both projects usable.

Q. I am going to come to that in a moment, but what I am asking you is simply this:

Can you give us any good reason why, with the question before the Commission as to whether or not the government should operate Roanoke Rapids, that you didn't pick Roanoke Rapids and Buggs Island and put them together and see how the picture worked?

A. I think I answered that. It is not before Congress and I have no knowledge of when it may come in. Any study I would make would probably fall outside of the year I selected.

Q. And you have no knowledge when the VEPCO might build it either, do you, except what is in the application?

A. The application indicates a rather reasonable construction schedule. I did select a year beyond

'52–'53 to make sure for the purposes of study that I had a sufficient period covered.

* * * * * *

[787] By Mr. WHITEHEAD:

* * * * * *

Q. Now, turn to page 614 of the transcript where you say, "I also studied load growth and load characteristics of the municipal and REA Cooperative systems which are located within reasonable transmission distance of the Buggs Island project."

Did this include a municipality which would have a load [788] in excess of 25 million kw. in 1955—25,000 kw., I meant to say, in 1955?

A. I don't get the question.

Q. Did this include a municipality which will have a load in excess of 25,000 kw. in 1955?

A. Would you mind naming them. Do you have one in mind, or do you want me to pick out one from my own records.

Q. I am asking you about any one, or more specifically, did you have Danville in mind?

A. I think I have answered the question on Danville, sir.

Q. All right. Did you contact any municipality to determine what its plans were?

A. No, sir.

Q. Have any municipalities been in to see you or given you any information as to their plans?

A. The information reported to the Commission on the annual power system statements, Form 12, which are available for many years of record, indicate their

new capacity and the load estimates for the next two years.

Q. Have any of them indicated to you their requirements for 1955?

A. No, sir.

Q. And you have no letters from any municipality requesting power from Buggs Island?

[789] A. The Commission does not market any power from public projects.

Q. That is what I am coming to. Did you get that information from the Secretary of the Interior?

A. No, sir.

Q. Can you tell us why you didn't?

A. In making our load estimates—and I have had much experience; I have gone into the field, for example, on the power market of San Diego and canvassed every large customer on the whole system and have come back and discarded their estimates and made my own, and the records show that I always came within a few per cent, so I do not consider a visit or a contact as a necessity for making a proper power market estimate.

Q. In other words, you could sit in your office here in Washington and you knew more about what they are going to need in 1955 than what they were doing themselves?

A. I think I would do just as well.

Q. Does that apply to the REA Cooperatives, too?

A. I have seen some of their estimates in the past, so that I think I can make a comparable statement.

Q. Do you know how much the REA Cooperatives would require in 1955?

A. I made an estimate.

Q. What is your estimate?

[790] A. For the 11 Cooperatives in Virginia, 31,300 kilowatts and 115 million kilowatt-hours.

Q. That is for how many cooperatives?

A. Eleven. I will list them for you, if you want me to.

Q. They are the eleven who filed the petition to intervene?

A. I believe so, but I am not sure.

Mr. HANKIN. I beg your pardon, I did not quite get the figures you stated.

The WITNESS. 31,300 kilowatts, and 115 million kilowatt-hours.

Mr. HANKIN. Is that the figure that appears on Exhibit 34?

The WITNESS. Let me check that.

By Mr. WHITEHEAD:

Q. Where is that figure in the record?

A. It does not appear in the record, except upon the questioning here. As I explained in my testimony on Exhibit 34, this Exhibit 34 was to see what the maximum amount of Buggs Island power was that could be sold to meet the entire requirements of small municipal and REA Cooperatives, and the peaking requirements of large municipal systems, and still have remaining sufficient energy to make the remaining capacity of Buggs Island dependable on a large electric system load.

[791] Q. Now, you have 31,300 kw., and what did you have for kilowatt-hours?

A. 115 million kilowatt-hours.

Q. That is, for 1955?

A. '55, sir.

* * * * * *

Q. If those who have any business in this field should come up with the figure for these 11 Cooperatives for 1955 of 58,000 kilowatt demand, as against your estimate of 31,300, that would present an entirely different picture, would it not?

A. No, sir. I will explain why. I considered in this marketing program that the REA's would be realistic in their programing of the power supply and the other river basins in Virginia like the James and the Rappahannock, which have possibilities of hydro power supply are much nearer and REA would look to such sources rather than trying to obtain it all from one source.

* * * * * *

[797] Q. So you have six of the eleven petitioning Virginia Cooperatives included in the service area?

A. In the special listing, yes, that I considered in a special category.

Q. What do you mean by "special category"?

A. In preparing Exhibit 34, the cooperatives supplied on lines 18 and 19, I might point out that the estimate I made was much larger than the amount included in any exhibit. I wanted to make sure I had enough to cover those which were nearby.

* * * * * *

The WITNESS. The estimate for the 11 Co-ops was about 32,000 kilowatts, as I gave it to you before, as I recall.

* * * * * *

[798] Q. Are these six which you just enumerated all within what you term a reasonable transmission distance?

A. Approximately so, yes.

Q. Could you clarify that statement a little bit so that we would perhaps know a little bit better exactly whether they are within or whether they are without this so-called reasonable transmission distance?

A. Except for Northern Neck, which I do not have the figures on, or recollect too well, all the rest are within what I consider reasonable transmission distance.

Q. And what are the existing power requirements for 1955 of the six cooperatives which you have included within this reasonable transmission distance?

A. I included in this exhibit 34 only 15,000 kilowatts and 55 million kilowatt-hours. That was limited by the amount which I allocated as a variable from Buggs Island to meet all the requirements.

Q. Fifty-five million kilowatt-hours?

A. That's right, and 15,000 kilowatt peak.

Q. In what manner, Doctor, were the future power requirements of these cooperatives determined?

A. From analysis of the past records which I have here, going back, in some cases, to '39.

[799] Q. Percentagewise was the increase per hour for them about the same as for the Vepco system?

A. It is a little bit greater. I can make the comparison, if you wish, by the slide rule as to the difference. Somewhat greater, yes. It would be a ratio

or '55 to '48, in the case of co-ops about 1.8, and in the case of the utilities, about 1.4 and a fraction.

Q. How much greater was the percentage of the expected growth of the cooperatives percentagewise, than over the VEPCO system?

A. The ratio would be between 1.8 and 1.4, approximately, between '55 and '48.

Q. All right. Doctor, you know that the REA, the Rural Electrification Administration, a government agency, maintains a staff of experts who prepare such load studies for the REA Co-ops, you know that, do you not?

A. I don't know if they do, sir.

Q. Well, I will ask you this: Djd you consult the REA in any way in getting at the anticipated growth requirements of the cooperatives?

A. I did not; no, sir.

Q. Did you consult any of the cooperatives affected themselves?

A. No, sir.

* * * * *

[803] Q. * * * you said that the operation of the Buggs Island system would be determined by the load characteristics on it?

A. On it.

Q. Now, if both Roanoke Rapids and Buggs Island were operated together, would you still say that the operation of Buggs Island would be determined by the load characteristics on the load it had to serve, separate and apart from the load to be served by Roanoke Rapids?

A. I do not know.

Q. You do not know. If both were operated by the same authority, should not the release of water from Buggs Island be controlled in amount to derive maximum benefits from the operation of both projects combined?

A. I would say yes to that.

Q. Now, is it not true that the release of water from Buggs Island, as assumed in your studies and outlined in your testimony, are based on the load characteristics which you assumed are to be served by Buggs Island alone, without regard to the [804] maximum utilization of the water at Roanoke Rapids?

A. No, sir.

Q. Why do you reach that conclusion?

A. Because in this study—I made two studies, actually, in one I routed the water to get the best out of Buggs Island. It also was found that the dependable capacity and all energy was utilizable for Roanoke Rapids. So if under this study the maximum is obtained from the Roanoke Rapids project and from the Buggs Island project, there is no more to be gained by any other operation.

Q. You state that you have made a study as to how the Buggs Island power might be marketed. Is there any certainty that the power will be marketed as you have assumed it would be?

A. I wouldn't know if it is a certainty, but it is a reasonable allocation of energy between months, I would say.

Q. If that is your answer, can you state what the differences would be if the assumptions were different?

A. What assumptions? I don't understand what your question is, sir.

Q. You have assumed here, have you not, that the Buggs Island power would be marketed in a certain way, and you have allocated who should get how much, isn't that right?

A. In substance, certain groups.

Q. Yes.

[805] A. Yes; certain groups.

Q. And the total of the certain groups make up the whole, do they not?

A. That's right.

Q. Now, if your assumption is wrong as to who is going to get how much of that power, then doesn't that change the whole picture?

* * * * *

The WITNESS. I will say that there are many combinations and permutations of serving these various loads. I did do this: I made a study as presented in my direct testimony. As the outside study, I assumed all of Buggs Island would go to nothing but REA and municipal systems, and in that way it came out, I mean, I have a sheet here if you want to see it afterwards or now, that the distribution of steam support would be such that it would permit of the maintenance of steam units during certain months so that a minimum of steam investment would be required, assuming that all of Buggs Island were marketed to public systems. That is an outside measure of how good the first distribution was.

I worked it both in a dry water year and an average year, to make sure there was no pitfall as to the ability to utilize energy.

[806] By Mr. WHITEHEAD:

Q. Again on page 616, you state the controlling factors which determine the usefulness of a particular site are availability of water supply, reservoir storage, and available head. Is it not true that reservoir storage need not be at the site, but can be anywhere upstream?

A. There are projects which have separate storage, yes. I mean, the operation of the plant with a reservoir and without a reservoir, of course, would be different, but as to storage alone you can provide it separately.

Q. In the case of the Roanoke Rapids project, is not all of the reservoir capacity being supplied upstream at Government expense?

A. I would have to say generally, no, if you admit that some headwater benefits might have to be paid.

Q. You would have to say no?

A. No; not at government expense, if they have to pay for some headwater benefits.

Q. Well, let us put it this way: Is it not true that the only reservoir capacity for Roanoke Rapids is at Buggs Island?

A. The only sizeable capacity, yes.

Q. And the proposed Roanoke Rapids dam itself provides only the ordinary pondage, does it not?

A. It is pondage; yes, sir.

[807] Q. Now, turning to page 616 of your testimony, you stated:

We, therefore, must consider the market to be served by a proposed power plant and its relationship to other generating facilities in the area.

To what extent have you considered the use of these two Roanoke River plants, Buggs Island and Roanoke Rapids, in light of the market as represented by the municipal and REA Cooperative requirements?

A. I considered this way: I first studied to see how large a municipal and REA load would have to be realized to first fully utilize the entire output of the Buggs Island project. As I pointed out before, they have 134,000 kilowatts and about 492 million kilowatt-hours.

Then I considered the fact, which I have some data on, that there are other projects nearby, like on the James River and the Rappahannock River. Relating them to the size of load which would be required to the probable loads to be realized in the foreseeable future, say, by '55, there was more than adequate capacity to meet all such loads from those projects, so there is no point in my studying some other project to meet the load requirement for 1980. It is obvious from the study that the Buggs Island project alone had plenty of capacity to meet up to 134,000 kilowatts of public load.

Q. Now, right at that point: You, of course, studied [808] the maximum peak demands of Virginia Electric and Power?

A. Yes, sir.

Q. Now, if in fact a considerable portion of the cooperative load were withdrawn from the Vepco system and had an independent source of power, their peak demand would be reduced accordingly by the amount of withdrawal, would it not?

A. The annual peak demand may or may not be reduced substantially, depending upon when the peaks are experienced for the co-op load. If they come at the same hour of the same month and the same day, then the reduction would be directly proportionate. If they come in the morning or at noon, even on the same day, it may be a smaller reduction.

Q. And when you refer to other generating facilities, are you referring only to existing facilities?

A. To existing and those which we know of as being under way.

Q. If other generating facilities were installed, would that affect your conclusions?

A. Installed when? That is a question of time.

Q. Before 1955. As I understand your figure, it is predicated on or fixed on 1955.

A. It is a question of how much would be installed. For example, if less than, say, 50,000 kilowatts were installed, it would make no difference; if more than that, then [809] I would have to make a separate study to determine what the consequence would be of any separate capacity.

Q. Now, turn to page 618.

A. Yes, sir.

Q. You were asked this question:

> Have you given any consideration to the requirements under which the Buggs Island plant

must be operated to give preference to municipalities and REA Cooperatives?

To which you replied:

Yes, we have given that brief consideration and have made an analysis of the power requirements of the entire area within economical transmission distance.

In view of the fact that the municipalities and the cooperatives are entitled at Buggs Island to preference, why did you give them only brief consideration?

A. I think the term "brief" is in line with the amount of work to be done. If you are familiar with load curve studies as such, to give one answer may require hours and hours of work, whereas, if it is serving the entire requirements of the municipals and REA cooperatives then it is a simple factor in your capacity computation. So, a certain amount of time may be devoted to a certain study with no indication as to the value of the study.

Q. Now, on reflection, don't you think that the consumers with preference are entitled to more than a mere brief [810] consideration.

A. Brief is only as to the time required for making a certain type of study. It is not brief in the way of an actual analysis.

Q. Did you give due consideration to the analysis of the requirements of the cooperatives and the municipalities?

A. I thought I did.

[811] Q. Have you given any consideration as to how the Roanoke Rapids plant should be designed in order to give consideration to preferred customers?

A. That is out of my field, sir. I am an electrical marketing man. We have experts in the field of hydraulics who are better equipped to answer that than I am.

Q. What did you mean when you used the phrase, "economical transmission distance"?

A. The same as I meant when I used it before in reply to your former question.

Q. It meant the same thing, but in different language?

A. In other words, in making a study as to how large a service area would be served from a project, it is dependent on which loads would be picked up and in what order. Sometimes an investment for a load in an extremity of an area may not be carried economically initially, but if some intermediate load is picked up, then the outlying load can be picked up.

Q. You state it makes little difference who operates Buggs Island, and that you found the dependable peaking capacity of Roanoke Rapids would be in the neighborhood of 91,000 kw.

A. Yes, sir.

Q. And that it has only about 10,080 feet of pondage.

A. Yes.

Q. Is it not true——

A. 10,000 acre-feet, I believe I said.

* * * * * * *

[818] Q. In Exhibit 34, have you made any such studies for Buggs Island and Roanoke Rapids combined?

A. No, sir. The extent of such studies depends in

large measure upon the probable loads to be served. Even assuming the load up to 134,000 kilowatts to public bodies, which is larger than may be experienced in '55, I saw no point in making a combination study, where it might be utilized in '70 or '75.

Q. Doctor, in view of the fact that Roanoke Rapids is in House Document 650, which also includes Buggs Island, do you not think you should have made a study showing a relationship of the two with the application contemplating withdrawing Roanoke Rapids from that comprehensive plan?

A. I am glad you said "comprehensive plan." I also work with the River Basin Division; I have sort of a roaming job. In a comprehensive plan, as such, the essential point is to make sure that the power sites are properly protected so they can be developed when economical. The installation, the hydraulic capacity, the design, is a matter of detail which is taken up as each project comes up, as in the case of Buggs Island, but the basic concept is to protect the power sites on an over-all basis. That is the basic point, with [819] variations. It is a question of time when you need the project and as to what time the project comes up, those matters will be taken up when the project is authorized.

Q. Notwithstanding all you said, it is a fact, is it not, that both Roanoke Rapids and Buggs Island are pitched in together?

A. Not as I understand. They are all listed. That doesn't mean 11 or so in the whole basin must be con-

sidered at one time. You can't avoid them if you make a comprehensive plan.

* * * * * * *

[823] Q. Turn to page 630, where you say:

> For purposes of my study it was assumed that the minimum amount of plant capability to be made available to the large electric systems would be constant regardless of the type of water year experienced.

Does this mean that you have assumed that the companies' needs must be taken care of first, and that the preferred customers are to get what is left?

A. Contrarywise. I assumed that the maximum benefits would go to the preferred customers in my study.

Q. Why did you phrase it that way, then?

A. It was probably unfortunate phrasing, but it is just the other way around. The figures show that in the Exhibit.

Q. The statement does not really reflect the true situation?

[824] A. Not in this situation; no.

Q. I see.

On Exhibit 36, for the average year, you show 27,000 kilowatts available for municipalities and 15,000 kilowatts for the co-ops, a total of 42,000 kilowatts. On Exhibit 34, for the adverse year, you show only 37,000 kilowatts for the same preferred customers. I ask you why.

A. The reason is this: That in an average year or better, the reservoir at Briggs Island need not be drawn down as far, and there will be at least a mini-

mum of 5,000 kilowatts additional capacity for use in public systems, so that they may check on the higher cost public plants. If you analyze those two Exhibits 34 and 36 month by month, a substantially large amount of capacity is available to the municipal systems particularly during March through September on the same principle—that they would have the benefit of this wheel capacity and energy going with it during the average year.

Q. Whatever be your reason, is it not the effect of what you have done to reduce it from 42,000 kilowatts to 37,000 kilowatts?

A. The other way around. I increased it in an average year from 37,000 kilowatts to 42,000, which would occur nine out of ten years.

Q. On examination of the two exhibits, you provide 53,000 kilowatts for VEPCO in an average year, and also in an adverse year. Why did you reduce the capacity available for [825] preferred customers but maintaining the same capacity for VEPCO?

A. In fact, I increased it. The controlling year is a dry year. The average year is one where water comes at a rate above the minimum, so all benefits associated therewith were allocated to public systems.

* * * * *

The WITNESS. On Exhibit 36, the figure on line 2 for December and the annual figure is 95,000; while on Exhibit 34, on line 2, columns 13 and 14, it is 90,000. There is more capacity available at Buggs Island during an average year, and the benefit associated therewith is allocated to municipal systems.

* * * * *

[829] Q. Why did you say only 32,000 kilowatt capacity could be delivered to the municipal and co-op systems from both plants when, in Exhibit 34, you show 37,000 kw. to be in from Buggs Island alone, and in the most adverse stream year?

A. 32,000, of course, is based on the most adverse stream year. In Exhibit 34, it is noted, or should be noted, that on lines 12 and 13, that the supply there to municipal systems is for peaking purposes—not all their requirements—but the peak portion of their requirements. It is a different study, in other words.

Q. I understand.

A. If all the requirements, which assumes that no other capacity is available, were to be met from the two projects, 32,000 kilowatts is approximately what is to be supplied if the remaining capacity is to be dependable on the large system loads. If part of the energy is supplied for peaking purposes—where large municipals have their own [830] capacity the effect is to increase it from 32,000 to 37,000—it is a range of figures——

Q. Would your answer on page 635 just read still apply notwithstanding that on Exhibit 36 you show that on an average year 42,000 kw. could go to the municipalities and the co-ops from Buggs Island alone?

A. Yes, sir; for this reason: That these municipal and REA loads have to be met as they occur and not as the water comes. Now, some of the systems have their own generating capacity, so in the average year they are equipped to utilize some additional hydro. It is not available in a dry year but on an average

year, because they, themselves, have generating capacity, they are not called upon to run around and get it elsewhere in case they are shut off.

Q. Is it not a fact that the peaking demands of the Virginia co-ops alone, or the Virginia co-ops together with the North Carolina co-ops, assuming other power sources, would call for 50 or 55 or 60 thousand kw. from Buggs Island? Could they get it or not?

A. That would depend upon the Department of the Interior.

Q. Is it feasible under the study that you made?

A. If they are to get all of their requirements, I think the Secretary of the Interior would have a little difficult job explaining what is to be done with the rest [831] of the capacity at Buggs Island.

Q. If you take Roanoke Rapids and Buggs Island and put them together, and the co-ops' demand for peaking purposes were 50 or 55 or 60 kw., would that be available or not?

A. If the co-ops could not provide any of their own stand-by capacity, it would depend, again, upon the Secretary of the Interior. If such amounts are supplied to meet the entire requirements, then there would remain capacity at the projects with insufficient energy to make them dependable on nearby systems.

Q. In other words, that would have the effect of materially reducing dependable capacity available to private power companies?

A. Certainly would.

Q. And if these cooperatives in Virginia and North Carolina all together provided steam generating capacity, and needed Buggs Island for peaking capacity,

would your study indicate that that would be feasible?

A. I believe I said that.

Q. Would you say it again?

A. I believe, as I said, up to 134,000 kilowatts and 492 million kilowatt-hours can be supplied to public bodies.

Q. Out of Buggs Island alone?

[832] A. Buggs Island alone.

* * * * *

[833] A. * * * * The requirements were 68,000 kilowatts, and 262 million kilowatt-hours for 1955 for the large municipal systems.

Q. And how much would be available to the large municipalities from Buggs Island?

A. Assuming that they would pay for what they needed, in other words, they would not have capacity standing by and buying more—that would be 15,000 kilowatts, as shown on line 12, column 14.

Q. And the small municipalities?

A. Seven million. That is just a small figure.

Q. 7,000 kilowatts and 27 thousand kilowatts. So the total for the large and small municipalities would be how much?

A. Total of what—load or total supply?

Q. Total amount available from Buggs Island.

A. I wouldn't say the amount available, but the amount allocated for purposes of this study is 15 plus 7—22.

Q. Give a complete answer to it. 22 what?

A. 22,000 kilowatts.

Q. How much energy?

[834] A. 65 million kilowatt-hours.

Q. You were asked about some of the municipalities, and you said you did not include them because they might get power elsewhere. Is that correct?

A. That is correct. During lunch I checked some of those to refresh my memory, and I find in reports on the Philpott we include Bedford, Danville, Martinsville, and—I am not sure what this is—Radford—as a part of the Philpott consideration.

Q. Is Radford among the projects in this comprehensive plan?

A. No. There is no power site at Radford.

Q. How is Philpott going to take care of all of these municipalities?

A. The only one of any size is Danville; all the rest are small. It has its own steam capacity, so it could use peaking power from Philpott and the rest could go in the local area.

Q. Are you allowing for any difference between your judgment and the judgment of the Secretary as to whether these municipalities might be included in the purchase and sale of Buggs Island power until some other power may be available?

A. I think the important point is to have them included somewhere so Philpott and Buggs Island would have a market. [835] As to how the Secretary may have divided them I have no knowledge of what he might do.

Q. You testified with reference to the cooperatives that you did not include in your Exhibit 34. Of course, they may be able to get power not existent at any time from the James or Rappahannock River.

Are you allowing for the difference in judgment on the part of the Secretary, who may want to meet the requirements of the cooperatives from Buggs Island, or, if possible, from Roanoke Rapids?

A. It so came out that it made no difference as to how much REA load there was because the amount allocated is small, only 15,000 kilowatts of the REA load of the estimated total of 31,300 kilowatts for Virginia alone. For purposes of Exhibit 34, considering the basic premise there, to deliver the maximum to public systems and still have remaining sufficient energy to make the remaining capacity dependable to the large system load.

[836] Q. Let us suppose, since you did not consult with the cooperatives and the REA, their studies, and so on, let us suppose that your 15,000 for the REA cooperatives was wrong, and let us suppose instead of 15,000 it would be, say, 90,000, would that affect the results of your testimony with reference to the amount available to the Virginia Electric and Power Company?

A. I believe I stated that I considered that contingency in making all of the Buggs Island go to public system, assuming 90,000 kilowatts hydro and the supply requiring 44,000 kilowatts steam standby, so the combined load would be 134,000 kilowatts total. I have considered that as part of the problem.

Q. So that if the cooperatives and municipalities would have more power than is available at Buggs Island, what would be left for the Virginia Electric and Power Company?

A. If they need more than 134,000 kilowatts, I would like to know where they are going to need it.

Q. What is the maximum capacity of Buggs Island?

A. Maximum ultimate capacity, I think, is 204,000 kilowatts, the initial installation is 108,000 kilowatts installed, and 90,000 kilowatts dependable.

Q. But you have allowed only 15,000 kw. for the cooperatives.

A. That is for that study shown on Exhibit 34 but I brought out also that should all of Buggs Island be devoted exclusively to public [837] load——

* * * * *

The WITNESS. Then 90,000 kilowatts of Buggs Island capacity, supported by 44,000 kilowatts of steam capacity would make possible the supply of a total load of 134,000 kilowatts.

By Mr. HANKIN:

Q. Yes, but what would be the realistic figure concerning the demands of the REA cooperatives in 1955; is it 15,000?

A. It would depend upon what policy they follow in getting their power supply.

Q. And you don't know what policy they follow?

A. I have suggested already that if I were advising the REA cooperatives, I would look into other river basins which would have power supply right nearby.

Q. But assuming they want the power from this river basin and the Secretary is willing to give it to them, how much will they need in 1955?

A. I believe I estimated Virginia alone at about

31,300 kilowatts. For the North Carolina Co-ops it could be as much as about 18,000 kilowatts.

Q. 18,000 kilowatts for the——.

A. Approximately, I did not make as detailed a study as I did for the Virginia cooperatives, but it is about of that order.

[838] Q. You mean 18,000 for North Carolina?

A. That is about the maximum for those I considered.

Q. And how much for Virginia?

A. I gave you that a minute ago. That was more exact, 31,300 kilowatts.

Q. So that the total would be how much?

A. About 50,000.

* * * * * *

[1632] Further cross-examination by Mr. MOORE:

Q. Dr. Jessen, when you were last on the stand, it appears at pages 858 and 859 of the transcript that we asked you about certain past and estimated future electric power requirements of REA Cooperatives in Virginia and North Carolina. I believe you there stated you had not compiled that data in the form that we desired, but that you would so compile it?

A. I did so, sir.

Q. Have you compiled that information?

A. I have compiled it, sir.

Q. Do you have an exhibit that gives us the facts?

A. I have prepared such an exhibit, one for each state, one for Virginia and one for North Carolina.

Mr. MOORE. Mr. Examiner, we ask that the statement which [1633] we are now presenting, entitled "Past and

Estimated Future Electric Power Requirements of REA Electric Cooperatives in Virginia", be marked for identification as Exhibit No. 56.

CHIEF PRESIDING EXAMINER. It will be so marked.

(The document above referred to was identified as exhibit No. 56.)

By Mr. MOORE:

Q. Dr. Jessel, does this exhibit truly and correctly, to the best of your knowledge and belief, represent the facts which are purported to be shown on that exhibit?

A. Yes, sir, it does.

Q. Just for the sake of brevity, will you read off for the record what are the actual peak demands in kilowatts and the amounts of kilowatt hours of the Virginia Cooperatives, in summary, for the years '45, '46, '47, and '48.

A. Would you want the undiversified, or my estimate of the diversified amounts? I have two totals there, the undiversified and my estimate of the diversified figures.

Q. The diversified.

A. 1945, the total power supply was 31,423,000 kilowatt hours, and the annual peak was 8,800 kilowatts.

For 1946, the annual energy was 40,625,000 kilowatt hours, the annual peak was 11,500.

For 1947, the annual energy was 53,407,000, and the annual peak was 15,000 kilowatts.

[1634] For 1948 the annual energy was 76,501,000 kilowatt hours, and the annual peak was 21,000 kilowatts.

I might state, in this connection, that that is broken down into two parts, that considered as purchased, and that considered as generated.

Q. It was in the light of that data that you made your estimate for 1955, shown in Columns 11 and 12, was it not?

A. Yes, sir; it was based on the information shown in line 23.

Q. And your estimates for the Virginia Cooperatives, as shown in line 25, for the year 1955, was what?

A. The total estimate was 135,000,000 kilowatt hours and 37,000 kilowatts but of that amount I did not consider that the cooperatives would utilize other power if they had their own generating facilities, so the estimate I gave, I believe in my testimony, was that corresponding to line 23. In other words, 115,000,000 kilowatt hours, and 31,300 kilowatts.

Q. Have you prepared a similar exhibit showing this data with respect to the REA membership electric cooperatives in North Carolina?

A. Yes, sir, I have.

Mr. MOORE. We ask that this exhibit entitled, "Past and Estimated Future Electric Power Requirements of REA Electric Membership Corporations in North Carolina", be marked as Exhibit 57.

[1635] CHIEF PRESIDING EXAMINER. Let it be marked as counsel suggests.

(The document above referred to was identified as exhibit No. 57.)

By Mr. Moore:

Q. Without taking the time to go into the detail of it, to the best of your knowledge and belief, does this exhibit truly and correctly set forth the facts that it purports to show with respect to the past requirements of the North Carolina cooperatives?

A. Yes, sir; it does. I might state that in my testimony on North Carolina, I gave a figure of about 18,000 kilowatts as the 1955 requirements. That estimate did not include the four cooperatives shown by small circles in the left-hand margin, namely, Brunswick, Lumbee, Carteret-Craven, and Pamlico-Beaufort.

Q. Have you prepared another exhibit entitled, "Estimated Magnitude of REA Cooperative System Loads to Utilize the Entire Output of Buggs Island Project"?

A. I had that ready, sir, at the time of my direct, as I believe I mentioned in my testimony.

Q. That was not introduced in evidence, was it?

A. I don't remember, sir, but I believe not.

Mr. Moore. We now ask, Mr. Examiner, that this statement which entitled "Estimated Magnitude of REA Cooperative System [1636] Loads to Utilize the Entire Output of Buggs Island Project," be marked for identification as Exhibit No. 58.

Chief Presiding Examiner: It will be marked for identification as Exhibit No. 58.

(The document above referred to was identified as exhibit No. 58.)

By Mr. MOORE:

Q. Are we correct, Dr. Jessel, in understanding that these three exhibits represent the basic data which you had in mind as background for the testimony that you gave in regard to this matter of estimated loads of the REA Cooperatives in Virginia and North Carolina, and municipalities?

A. These are the basic data rearranged in the form you requested, particularly the first exhibits of the series.

* * * * *

[1755] Cross-examination by Mr. WHITEHEAD:

Q. Dr. Jessel, do you have before you Exhibit 56?

A. I do, sir.

Q. This is the exhibit dealing with past and future estimated power requirements of the REA Electric Cooperatives in Virginia.

A. Yes, sir.

Q. Of course, there you are dealing just with those 11 electric cooperatives which are parties to the petition to intervene?

A. That is true, sir.

Q. For 1945, '46, '47, and '48, you give us the actual figure, do you not, both as to the kilowatt demand, and also the kilowatt-hour consumption?

A. Except where estimated, as shown by footnote. The actual figures are obtained from different sources, so they are not on the same basis.

Q. Have you in working up the figures which you have outlined in the last two columns, that is, the estimate for 1955, both on the kilowatt demand and kilowatt

hours, taken into [1756] consideration the increases from year to year from 1945 through 1948?

A. Well, I had energy data for '45, '46, and '47 complete at the time I made them. I only had part of the '48 information at that time, but since that time I have obtained the rest of the data by estimate or from more recent reports.

Q. But your 1948 figures are actual figures now?

A. To the best of my knowledge, yes. They are estimated in part, as you will note, by footnote 1. Those show purchases and generation separately. Some of those figures were not available in the form in which they were requested for this particular purpose.

Q. I don't want to ask you to make any arithmetical computations, but I do want to call your attention to some of your figures here which may involve some of those computations and ask you as best you can to answer, and if you can't to just please say so.

A. All right, sir.

Q. We notice, first, that from 1945 to 1946—and I am now dealing with the kw. demand—it increased 2,700, is that right?

A. That is total.

Q. Total?

A. Yes, that is right.

Q. Now, then, from '46 to '47, the increase was 3,500; [1757] was it not?

A. Three thousand five hundred, that is correct, sir.

Q. And from '47 to '48 it was 6,000, was it not?

A. That is correct, by those figures.

Q. Now, those three figures indicate very definitely what, Dr. Jessel?

A. Of themselves arithmetically they indicate an increasing load growth.

Q. Is there any other factor present which would tend to minimize that conclusion?

A. The factor which must be considered, however, is that of the effect on the long-term. By that I mean this, when customers are added, or when customers are taken on, there is, for a while, a slow build-up of use. In this case, particularly during '45 and '46, the matter of electrical appliances was a controlling factor.

Between '47 and '48, when the market became more abundant as to appliances, it indicated an upsurge. So any study without considering what the opportunity was to utilize electric energy could be misleading.

But I attempted, in my long-term estimate, to average out what the future use might be, based upon the factual situation as it occurred, in my opinion.

Q. But the fact is that the increase in that year has been greater than the increase in the preceding year, is that correct?

[1758] A. The figures show that, but they are not completely informative of themselves.

Q. They are highly indicative, are they not?

A. It is a question of what is behind it, because I was here and I was trying to purchase some of this equipment which uses energy.

Q. When we turn to 1945, the total was 8,800, was it not?

A. That is right, sir.

Q. And when we turn to 1948, it had increased to 21,000?

A. To 21,000 kilowatts, that is right.

Q. That is an increase of 12,200, substantially more than 100 percent increase, isn't it?

A. It is.

Q. In three years' time?

A. It is, based on the figures shown.

Q. Now, then, if you would add together the increases for '45, '46, and '47 which I total to be 12,200 increase and divide that by the number of years involved, three, you would get somewhere in the neighborhood of an average of 4,000 a year, would you not?

A. Arithmetically, about 3,000.

Q. About 4,000, isn't it?

A. About 4,000 in three years, that is correct.

Q. Now, in going from the actual figures of '48 to the projected or estimated figures for 1955, you have increased it [1759] from 21,000 to 37,000, or an increase of 16,000?

A. That is not a full indication of the increase.

Q. I know we are talking just about kilowatt demand now. Let's talk about that now, kilowatt demand.

A. If I might point out, in estimating the loads, kilowatts and kilowatt hours are not separable. The figures show what you say, but that does not tell the whole story.

Q. All I could do was, first, to take what you put on this chart, which is the kw. demand; then I

will take up the kilowatt-hours, and you can explain them when you get done. I think that would be the orderly way for us to proceed.

A. All right.

Q. Now, going back, you take 21,000 kw. demand for '48 as actual, and you estimate it at 37,000 for 1955, which I think is an increase of 16,000 during that seven-year period.

A. That is correct, the difference between those two figures would give 16,000.

Q. Now, if you would divide that 16,000 by the seven, the number of years involved, you would have about 2,300 a year, would you not?

A. Arithmetically, that is about right.

Q. Well, arithmetically or otherwise, why was it that though the increase during the last three years had averaged more than 3,000 a year, you only allowed for an increase for these coming years of about 2,300?

[1760] A. I thought I explained that once before.

Q. Explain it again.

A. The consumers in 1945 were restricted as to what they could use, by what they had to use in the way of electrical appliances. Now, it is a well-known fact that up until about 1947 or 1948 it was about that time before they became sufficiently plentiful on the market to be utilized. So obviously any record based on those factors would not be a good indication of the future requirements.

Q. You said that was for '46 and '47.

A. '45 and '46 were the two years I had in mind particularly.

Q. Don't you have before you something to show that from '47 to '48, the increase was 6,000, as against 2,700 from '45 to '46, and 3,500 from '46 to '47?

A. Because of that factor appliances became more available and they used more per customer.

Q. That is your explanation of that?

A. Yes, sir.

Q. Now, turning to kilowatt-hours. I notice you have allowed a considerable increase in that item. From '45 to '46 the increase in kilowatt-hours was 9,202,000, roughly, was it not?

A. Nine two, approximately.

Q. And from '46 to '47, it was 12,782,000?

[1761] A. Approximately correct.

Q. And from '47 to '48, it was 23,094,000?

A. Twenty-three one, was it not?

Q. Twenty-three what?

A. One, approximately one.

Q. Well, now the total increases for those three years is about what, about 45 million?

A. Approximately.

Q. And divided by the three years, that would be 15 million a year, would it not?

A. That is what the figures would show.

Q. How much yearly increase have you projected or estimated for the next seven years, as against this average of 15 million actual for the last three years?

A. About eight and a half million, approximately.

Q. In other words, you have cut it in half then for the years to come, over the actual experience of the last three years?

A. Figurewise it indicates that, but I must say that in comparing that with the past years, it is necessary to consider what took place during those years, as to ability to utilize energy.

Mr. WHITEHEAD. Would you repeat that, I don't think I caught the full import of that?

The WITNESS. The figures would show the estimate to be smaller for the future, based on a comparison of the record for [1762] '45 through '48, but the record for '45 through '48 has to be considered in the light of what was available in the way of appliances. I don't think that is indicative of what the future may be.

For example, let me point out what I mean: If you had appliances in '45, the '45 figure would have been a lot larger, it could have been, so the difference would have been less. If '45 had been higher, '46 would have been higher, '47 could have been somewhat higher, probably, '48 may not have been much higher, because you have the appliances now.

By Mr. WHITEHEAD:

Q. Doctor, have you entirely overlooked in your calculation the fact that within the last two or three years a great number of rural lines have been built, new customers added who have not been used to electricity, and therefore haven't been using it to its full extent?

A. I didn't attempt to overlook that in my future estimates, sir.

Q. Did you take that into consideration, or leave it out?

A. I thought I did.

Q. This figure of 37,000 kw. for 1955, and 135 million kilowatt hours for 1955, do you think that is a conservative estimate, or is that a liberal estimate?

A. I wouldn't call it liberal, and I wouldn't call it [1763] conservative, either.

Q. Do you think it is somewhere within the range of the estimate that the Federal Power Commission made in 1947 for the Southeastern Region, and missed it by more than 40 percent? Would you put it in the same category as that? That is one that you helped make up.

A. I said I reviewed it. I didn't make the figures up, I reviewed it.

Q. You said you had a part in it.

A. I had a part.

Q. Would you put this in the same category as that, or would you be more dogmatic about this one?

A. Well, I think this is pretty good.

Q. Pretty good. And you think the figures presented by the Administrator of the REA are all offsides, do you?

A. Let me see what he presented.

* * * * * *

By Mr. WHITEHEAD:

Q. May I refer you to Exhibit 43?

A. I am trying to find a copy of it, sir, if I may take a [1764] second.

Q. Do you have it before you, Doctor?

A. I have it now, sir, thank you.

Q. I am referring now to the first page. In the letter from the Administrator of the REA to the

Secretary of the Interior where it is said the estimated requirements for 1955, that is, kw. demand, will be 58,000. Do you think that figure is entirely too bright and too rosy?

A. Compared to mine, it is.

Q. And the same thing is true with reference to the kilowatt hours?

A. It is much higher than I think it should be.

Q. Now, with reference to the——

A. I might say in that connection I did read this letter and that I do not recall the Administrator saying that is what he approved. I also note that these estimates are based on expectancies of receipt of certain applications. That to me does not indicate a final figure as to what the Administrator's office may pick for the future, as an estimate for the year.

Q. Is your figure a final figure?

A. It is for this hearing.

* * * * *

[1765] By Mr. WHITEHEAD:

Q. Turning to Exhibit 57, which seems to be a like study of the North Carolina REA Electric Cooperatives, without going into detail, did you arrive at your figures for both kilowatt demand and the kilowatt-hour consumption on the same basis as you did in exhibit 56 for the Virginia REA Cooperatives?

A. I did. The only difference in going into 57 is that I did not have to consider generation by the cooperatives. They were all purchasers, from the data I had available, so I did not have to look to see what the generating capacity might be in the future, and

how it may be handled. Except for that point they are made on the same basis.

Q. Now, Doctor, we have your estimates for both Virginia and the North Carolina REA Cooperatives before you. Will you please tell us what is the approach you made in getting at these figures? How did you arrive at it?

A. I did have the REA reports on a calendar year basis for the years '45, '46, and '47. They show customer, they show use, they show no peak. We have for the year 1945 all the REA's that were in existence at that time. They had the customers, the type of service, the demand, and the annual energy. We also have the Form 1 reports, which have in particular the sales figures to the co-ops who purchase energy, and the average monthly peak and annual demand in that report. We also have the Form 12, an engineering report, which has comparable data. So in going [1766] through I scanned every report from '45, which we had in our files, the Form 1's and the Form 12's. I attempted from that to make a judgment figure as to the future estimates.

Q. What factors did you take into consideration and what percentages did you use, and how did you arrive at those percentages? Is this a magic formula, or is it something that you can put your finger on and feel and touch?

A. They are not magic.

Q. Then if it is not magic, what is it?

A. We have studied this area, I think, and also farm loads in the Missouri report which just came out. I also worked up there the detailed method of

working out the household use and the farm use, by type of farm, use on each type of farm, and the weighted averages. I think that report is the first one of its kind which prepared the farm or rural loads on a rural basis. I had that to help me.

We prepared and made reports for the upper and lower Colorado which I worked on. I had many reports behind me, so this is not the first time I have made this kind of a study. It is experience generally that goes into these things, plus the figures you have to work with.

Q. I am just asking you, how do you get at these figures? Can you tell us, put down on paper, how you arrived at these conclusions, what factor averaged so many percent, another factor averaged so many percent, and the total averages the [1767] average that you gave here? How did you get at these figures, that is what we are interested in?

A. In the case of Virginia, I had energy available from 1939 to 1948 for each co-op, and the actual use by each. I had the reports for '40 and '45, which were actually reported for those in existence. I analyzed the past growth and what the reasons were for the variations. Then I projected that growth into the future and compared that with Mr. Thomas' figures for the utility load, and with my figures for large municipal and small municipal loads.

* * * * * *

[1768] Q. Have you completed your answer, Doctor?

A. Then I compared the rate of growth with the large private systems and the municipal systems. I had before me, of course, all these reports for '45,

and from those REAs which were required to file annually. Based on those figures I projected the future estimates.

Q. You admit, do you not, that the growth on the REA cooperatives is larger in proportion, percentage-wise, than the national average?

A. I don't work on national averages, they are quite deceiving.

Q. Well, I will ask you this: Is the growth on the REA systems percentage-wise greater than that on the Power Company system?

A. I believe that is what the figures show. I can check it if you wish me to.

Q. You can answer that tomorrow, if there is any question and you are not prepared to answer it now. Will you do that [1769] tomorrow?

A. Yes, sir.

Q. Can you give us the full formula that you used in getting at these estimates?

A. That is the basis of it. The information available was that which I used, so I could not go much beyond that point.

Q. In other words, do you attribute a certain percentage to a certain factor, and another percentage to another factor, add it all together and get 100 percent and arrive at this total, or do you kind of use an ouija board magic in this thing in arriving at your conclusion? That is what I am trying to find out.

A. It is not an ouija board magic. After you have made many estimates of this type you get an experience in projecting such loads with fairly good accuracy. If you make the first study of this type, you have to make all the details, and the first study of this

type that the Commission ever made was the Missouri Basin power market survey, including five regional surveys, and then every subarea was worked out in great detail, and once that information is available it is always retained.

* * * * *

[1818] Q. Referring to Exhibit 31, and the exhibits introduced through you yesterday, which I believe were Exhibits 56, 57, and 58——

A. Yes, sir.

Q. (Continuing.) Will you just state for the record what was the percentage of growth that you estimated the REA Cooperatives in Virginia would have in 1955, as compared with their actual experience in 1948? What was the percentage?

A. Is that for Virginia, for all private systems, or just for Virginia?

Q. You can do it either way, whichever would be most convenient to you.

A. I have figures prepared on both ways, and I might as well give you both to have the record complete. Mr. Whitehead asked me at one time '47 with respect to '55, and another time '48 with respect to '55. Now that I have all the figures, we can get them in at one place.

Q. What I am particularly interested in is the comparison of 1948 with your estimate for 1955.

A. I will do that on these various bases here.

For the Virginia Electric and Power Company, the ratio of the 1955 energy to the 1947 energy is 1.66.

For the same company, the ratio for the annual peak demand of 1955 to 1947, is 1.58.

For Virginia Electric and Power Company, the ratio of 1955 [1819] to 1948, for energy, is 1.49——

Q. In other words, there is an increase you have estimated for Virginia Electric and Power Company of 49 percent?

A. Between 48 and 55.

Q. Between 48 and 55?

A. That is for energy and for capacity, annual peak load, in other words, 1.42, or 42 percent.

Q. Forty-two percent increase for Virginia Electric and Power?

A. That is right.

Q. All right, go ahead.

A. If I may complete this at once I can get it out of the way.

Q. Go ahead.

A. Carolina Power and Light Company. The ratio of annual energy, 1955 to 1947—Carolina Power and Light and Tide Water Power Company, is 1.77, and of annual peak load, 1955 to 1947, 1.63.

Now the comparable ratio for energy for Carolina Power and Light Company, and Tide Water Power Company, 1955 to 1948 energy is 1.52, and for the annual peak loads, 1955 to 1948, 1.48.

Now, for large municipals, I only have it '55 to '47. That has been asked for, and I thought I would put it on one place. The ratio of the annual energy, 1955 to 1947, for the large municipals, 1.58. For the annual peak loads, 1955 to 1947, is [1820] 1.55. Now, for the Virginia REA Cooperatives, the ratio of annual energy, 1955 to 1947, is 2.52, and for the annual peak loads, 1955 to 1947, it is 2.47.

The comparable figure for the ratios for 1955 to 1948, is 1.76 for annual energy——

Q. That means you have estimated the REA of Virginia Cooperatives would increase 76.5 percent over 1948?

A. That is correct. And for the annual peak loads, also 1.76. The North Carolina REAs, the ratio of 1955 to 1947 energy is 2.68, and annual peak loads, 2.53 for the same years. The ratio of 1955 to 1948, for annual energy is 1.85 and for annual peak loads, 1.75.

Q. Do not those figures show that you have allowed, that you have assumed, the cooperatives will have substantially greater increase in their growth than that of the private companies?

A. I said that yesterday, sir. I didn't give the figures, though.

Q. You testified yesterday in regard to the effect which you felt should be given for the fact that electric appliances had become very much more readily available these last two or three years. Is it not true that the data which Mr. Spellman furnished this morning from the 1948 report of the REA Administrator to the Secretary of Agriculture, tends also to support the view that there is reasonably to be expected a decrease in the [1821] rate of growth of the cooperatives, as compared with these last three or four years?

A. That information taken with the studies I have made indicates that when there is a pent-up demand for a certain type of facility, once that is met, then

the requirement for that facility thereafter is as the normal growth requires. It requires more than a simple reference to the figures he read.

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CHIEF PRESIDING EXAMINER. You mean something like has happened to the demand for new automobiles during the past two or three years?

The WITNESS. Yes, sir; I think you can buy one quite easily now.

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[1822] By Mr. HANKIN:

Q. In connection with that, Dr. Jessel, have you had occasion to study the mathematics of the law of supply and demand?

A. I have been exposed to it through our economists, but I have never had the impression that it lends itself to any precise mathematics.

Q. Have you ever read the works of Professor Henry Schultz of the University of Chicago on the mathematics of the law of supply and demand?

A. I don't recall reading that, sir.

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Q. Did you study mathematics at Harvard?

A. I did; it is a long time ago, though.

Q. Under whom?

A. I studied under some of the best I think they had.

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[1834] By Mr. HANKIN:

Q. Mr. Jessel, in arriving at your estimate of the capacity and energy demand of the cooperatives in

Virginia and North Carolina for 1955, did you take into consideration the probable growth in population?

A. In general. I have a rough idea of what it would be nation-wide, and we also had made previous studies of that in our regional office.

Q. What consideration did you give to it?

A. I knew that the population, that is, I had the impression that the population growth, as estimated nation-wide, and subdivided by states, would not be too large, compared to the rate of increase of power load.

Q. Was it, say, 10 percent? What effect did it have on your estimate for 1955? What percentage did you attribute to it? What weight did you give to that factor?

A. No weight directly. I simply said I considered that as one of the factors.

Q. But you did not give it any definite weight in your estimate for 1955, did you?

A. Not as such specifically; no.

Q. Did you give any consideration to the probable increase in the number of consumers?

[1825] A. That is the function of population, sir.

Q. Oh, no. I am asking you now about the number of consumers.

A. I gave consideration to developing the REA loads in Virginia on that basis where you take the rural residential load and the rural farm load, and the urban residential load. That type of analysis is adapted where you are making a study for a state as a unit, but when attempt is made to determine what

proportion would be served by each agency in the area, then that method has very little meaning.

For example, we have records that the Virginia Electric and Power Company serves rural loads. They had 60,000 customers, approximately in '47. We also have records of what the loads are which the REA served.

Now, the REA systems, as has been represented here, are not serving merely farm customers. They serve residential customers who have no farms, and they also serve customers who have farm use and home use. They also serve some commercial and industrial loads.

So any development on a purely farm basis, along that line, I did not use because after I got it I wouldn't know what to do with it.

Q. Now, will you answer my question?

A. I had a pretty good idea what the possibilities were; yes, sir.

[1826] Q. Did you give that any weight? Is your estimate reflected in any amount; that is to say, as to the probable increase in number of consumers?

A. I have a figure for REA consumers, but I didn't give it that weight.

Q. That is what I would like to know. What is that figure, and what function does it play in your estimate of the growth between 1948 and 1955?

A. I had not tabulated this information when I gave you my papers, but I had all the reports, which are here, and you may have them at any time you

wish. But I did go back laboriously and spend a few hours.

* * * * *

By Mr. HANKIN:

Q. I asked you for 1948 to 1955.

A. Just a moment. You asked me how I got those figures. I have here tabulated for every cooperative in Virginia the number of consumers and the kilowatt hours per residential [1827] consumer in December of each year, for the 11 in Virginia, and for the 17 in North Carolina. I put these figures down, and you may examine them, if you wish.

I also had available, when I testified, the energies for '45, '47, and '48. I also determined, after much work, the energies from '43 to '44, for both Virginia and North Carolina. This is an example in point.

One series of data I used of this type, without consideration of what they mean, they can be quite deceiving; for example, in 1943, 1944, the Jones-Onslow system had a load of 48 million kilowatt hours in 1943 and 32 million kilowatt hours in '44. Such data, if used as recorded, would have indicated the cooperatives in North Carolina were all done, where, as a matter of fact, after some recollection and trying to dig back, those two years were abnormal in that they represented the period when the Jones-Onslow Cooperative was serving the Navy loads at Cherry Point and New River.

By having such data I prepared a summary table which shows the number of customers, annual energy, and kilowatt hours per customer. I will read those

to you, if you don't mind, just to show you what I considered as one of the factors.

Number of customers in 1941, 11 cooperatives in Virginia, 17,789; 1942, 18,943; 1943, 19,509; 1944, 20,972; 1945, 23,837; 1946, 29,656; 1947, 38,527; for 1948, 47,553.

Q. Now, will you state what would it be in 1955, and how [1828] you arrived at that figure?

A. I did that by proportioning, and I will give you the ratio. I thought I had it on the side here, but I want to see that I have the right figure.

The ratio of 1.52 checks. It gives approximately 72,000 customers in Virginia. Now, the total annual energy in 1943——

* * * * *

Q. That is a ratio between what and what?

A. '48 and '55.

Q. A straight-line basis?

A. No, sir.

Q. What kind of ratio are you using?

A. As of the time, I believe the EEI had figures by states as to the saturation state-wide, and I based it on that, as I recall, but I can look that up, if you want me to.

Q. Do you happen to know what kind of a curve growth in population follows?

A. I did not plot that on a population basis; no.

Q. Answer my question, do you know?

A. There is no direct relation between number of customers and population growth, sir.

[1829] Q. Please answer my question, Mr. Witness.

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The WITNESS. May I have the question again?

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The WITNESS. That means nothing to me, sir.

CHIEF PRESIDING EXAMINER. You don't know, then?

The WITNESS. I don't know what that means; what kind of a population curve follows.

CHIEF PRESIDING EXAMINER. You don't understand the question?

The WITNESS. That is right.

CHIEF PRESIDING EXAMINER. Do you want to try it again, Mr. Hankin?

Mr. HANKIN. I am sorry, it is a very simple question.

CHIEF PRESIDING EXAMINER. He says he doesn't understand it. Now, do you wish to put it in a way that he will understand?

By Mr. HANKIN:

Q. You know, of course, that the population has grown in [1830] this country since the year, say, 1776?

A. It has been known to be so recorded.

Q. Do you know whether the growth in population from year to year increases?

A. That, sir, is not known. The population is taken every ten years. Experts who think they know something about it, make estimates.

* * * * *

The WITNESS. Your Honor, I have no objection to answering questions simply, but I also know how some of these data are obtained and the census is taken once every ten years on the national population.

CHIEF PRESIDING EXAMINER. You are afraid to answer yes or no, sometimes, because you are afraid

that will be construed to mean something you did not intend.

The WITNESS. That is right.

CHIEF PRESIDING EXAMINER. I am aware of that.

By Mr. HANKIN:

Q. Now, when you talk about the census taken every ten [1831] years, do you know whether the census has arrived at any curves representing the growth in population?

A. In the past, particularly in California, while in that office, I spent a lot of time on estimating population growth for California with the Regional Engineer. At that time I had, I thought, a pretty good concept because the telephone company out there, one of the biggest companies in the area, came to us for our figures and they thought they were pretty good. We also estimated the population for California for, I believe the year '40, based on '38, which was quite close. I have done that in the past. That curve, as I recall, corresponds to what we normally call an "S" curve. That is one of the shapes which population was supposed to follow.

If you take the history of population in Germany or France, you find that it is not so, because the "S" curve dips and rises again. I am not saying that would apply here, because of the information to date. I have not made that kind of a study for this particular purpose.

* * * * *

The WITNESS. I don't recall seeing such curves. They may [1832] have them, but for the last six or seven

years I have been working on other matters. We have economists who take care of that.

CHIEF PRESIDING EXAMINER. We do not need that. It is apparent, Mr. Hankin, that his answer is no.

Mr. HANKIN. Thank you.

By Mr. HANKIN:

Q. You say that you have used certain ratios and I asked you whether the ratio was a straight-line ratio, and you answered in the negative. What kind of ratio did you use in arriving at the consumers in 1955?

A. I gave you the figure I used. The reason why no particular kind of ratio was used was that in the figures I just quoted you for customers from '41 through '48, by their amounts, were influenced by what load could be taken on during those years, particularly during the war years when materials were difficult to get to connect customers. I don't attempt to use a purely mathematical approach to these things.

Q. But when you say you use a ratio, you must have used some figure. What is that ratio?

A. I gave you the ratio, 1.52.

Q. 1.52, and how did you arrive at that ratio?

A. As an estimate. I had the background data here to refer to it.

Q. Please give it to us, so that when we read the record containing the answers to my questions we will be able to arrive [1833] at the same conclusion, Dr. Jessel.

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The WITNESS. No; I cannot, sir.

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By Mr. HANKIN:

Q. Mr. Jessel, I did not quite get the figure you arrived at as to the number of consumers for 1955. Will you please give it to us again?

A. 72,000.

Q. That was arrived at by applying the ratio of 1.5?

A. 1.52.

Q. It is the ratio between what and what?

A. '48 to '55. Let me check that again, now. That is close enough.

Q. Now, Mr. Jessel, a ratio has a numerator and a denominator, does it not? And if you arrive at the quotient for 1955 [1834] you cannot arrive at it as a ratio for 1948 and 1955, can you? I asked you what the ratio related to. The ratio of what to what?

A. The '48 figure multiplied by 1.52 gives 72,000. '48 is 47,553 times 1.52, and is 72,000 and a fraction.

Q. You applied that ratio to 1948 in order to arrive at a figure for 1955, but what is that ratio?

* * * * *

Q. The ratio has a numerator and a denominator. What is your numerator and what is your denominator?

A. Probably the ratio is not the word to use. I multiplied the '48 figure by 1.52 and it gives the figure I gave you for '55. Now, whether you call it a ratio or something else, I am not prepared to say.

Q. You called it a ratio.

A. I said the ratio of '55 to '48 was 1.52.

Q. But, Mr. Jessel, I am asking you how you arrived at the figure for 1955. You cannot take the

1955 figure and show me how you arrived at it, can you?

A. No; I thought I explained that I multiplied, based on my experience and judgment, the '48 figure by that factor, 1.52.

Q. You mean you pulled that 1.52 out as a matter of [1835] judgment?

A. Experience and judgment.

Q. On what did you base that judgment?

* * * * *

The WITNESS. I had before me, sir, the various reports which I am willing to turn over to Mr. Hankin, on which I estimated the future number of customers, and the kilowatt hours per customer.

Now, I was faced with this problem: I included war years, I included early postwar years, and I had to arrive at a basis which I felt, within myself, would be a reasonable basis. I considered our standard method, which I have already explained, and I had to discard it because of the fact that it would not lead me to any conclusion that I could support.

So I say again that the figures are based on my experience and judgment, considering the information available to me, and it is all here, at least copies of each.

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[1836] The WITNESS. The factors I indicated, I might read the energy and the kilowatt hours per customer for Virginia, which you asked me about before. I considered those factors in arriving at that figure.

By Mr. HANKIN:

Q. You considered the energy factors?

A. And the customers, and, in my judgment, made an estimate for the future based on that.

Q. In order to arrive at the number of customers for 1955?

A. I took the number of customers in the past as an indication and multiplied the last figure by—I won't call it a ratio now—by a figure of 1.52, approximately.

Q. Does it make any difference, Mr. Jessel, whether you [1837] call that a ratio or not? What is the character of the figure 1.52?

A. It is a multiplier, as I use it, sir.

Q. Yes. All I asked you is, how do you arrive at that figure of 1.52, to the second decimal place? If you don't want to answer the question, please say so, and I will proceed to something else.

* * * * * *

CHIEF PRESIDING EXAMINER. * * * Dr. Jessel, have you answered that question the best you are able to do?

The WITNESS. I thought I had, sir. There is nothing else to add.

CHIEF PRESIDING EXAMINER. You can take his answer. You will have to argue later whether it is sufficient or insufficient.

By Mr. HANKIN:

Q. In arriving at your estimates for 1955—I am now talking about your estimate of capacity and energy demand as shown on Exhibit 56—have you considered the percentage of farms not yet electrified

and what steps are being taken to electrify those farms?

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Mr. HANKIN. In arriving at his estimate of the capacity and energy demand for 1956, for the REA cooperatives.

[1838] Mr. GATCHELL. You mean 1955?

Mr. HANKIN. 1955.

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The WITNESS. I gave consideration to it, but not numerically.

By Mr. HANKIN:

Q. What consideration did you give to it?

A. As I recall, when I first began this I referred to the E. E. I. Annual Releases as to electrified farms.

Q. Did you ask the REA as to what steps they were taking to electrify the farms which are not yet electrified?

A. I did not, sir.

Q. In arriving at your estimate for 1955—and again I say whenever I use the words "In arriving at the estimate for 1955", I mean your estimate for capacity and energy of the REA cooperatives, as shown on Exhibit 56, so it will not be necessary for me to repeat it all the time—what percentage saturation have you assumed in 1955 for electric irons?

A. I did not do it that way, sir. I have no percentage for that.

Q. Do they affect the amount of power and energy needed for these farms?

A. They use energy, sir.

Q. Have you considered water pumps?

A. Not specifically; no, sir.

[1839] Q. Electric water heaters?

A. Not specifically as such.

Q. Milking machines?

A. No, sir.

Q. Electric hay driers?

A. Not specifically.

Q. Electric refrigerators?

A. Not specifically.

Q. Freezers?

A. Not specifically.

Q. Now, if you have not considered the percentage saturation as of 1955 for all of these appliances which are used in farms and farm homes, how did you arrive at your estimate for 1955?

A. I studied the kilowatt hours per consumer for the past record, and made an estimate for '55; multiplied that by the estimated number of customers to get the energy. I took the energy and applied a load factor of about 43 percent, I believe, to get the annual peak load.

Q. I would like to ask you to state the same thing you said in terms of actual figures that you used.

A. 1943, kilowatt hours per customer, 1,289. I worked these up last evening, but I had them all available when I made the estimate, and put them down in the form so that you could have them today.

[1840] '44, 1367 kilowatts per customer; '45, 1318; '46, 1370; '47, 1386; '48, 1570; '55, 1875.

Q. And that would hold, irrespective of what variations there may be in the percentage saturation of all these appliances for 1955?

A. In selecting——

Q. Answer my question.

A. No; I would say that in arriving at the figure of 1875 I attempted to give weight to such factors.

Q. Very well. And what weight did you give to those factors?

A. The predominant weight which I considered in these figures, in fact, they were in three categories. One was use of electricity per customer varies with cost. There will be little opportunity from the figures I have seen of getting any Buggs Island power much before early '53 or the latter part of '52. If the REA Cooperatives in Virginia go ahead with their steam program for three 11,000 kilowatt units, it may be about '52 before that is available. It would be between '53 and '55 before any effect of any possible lower cost may be appreciably felt. So arriving at the estimate of 1875, I attempted to take that into account, in that the consumer in buying energy is influenced by the price that he has to pay for it.

Q. You used the phrase "use of electricity varies with cost." What is the variation?

[1841] A. The lower the cost per unit, per kilowatt-hour, the greater the use per consumer. I think that the records of the past can be plotted to show that. The Commission, I think, has plotted, or has available information showing average costs by various utilities over past years showing use per average customer in the various categories. That can be ascertained from available data.

Q. Do I understand you to say in effect—I believe you are right—that a reduction in rates is a stimulant toward the greater use of electric energy?

A. The facts and the figures available indicate that, sir.

Q. Now, then, as applied to the situation here, you say Buggs Island will not come into operation until 1953.

A. The latter part of '52 or '53, something like that, I guess.

Q. And therefore we shoudn't expect a large increase in electric energy betwen 1948 and 1953, but that after 1953 with the lower rates you would expect a large spurt up?

A. No; I didn't say energy. In other words, the use per customer would not, in my opinion, rise too rapidly. Customers may be added up to that period and from that point on.

I might say in that connection that the area will have, of course, a saturation of customers.

[1842] Q. So that between '53 and '55, what do you expect to happen in the curve of the demand for electric energy?

A. As I estimate it here I expect that there will be an increased use per customer. If the program of REA continues between now and 1953, they are going to add customers probably at a fairly good rate, but the use per customer may not be even as high as I think I have estimated, until that upsurge becomes felt in the way of appliances, equipment, and so forth.

Q. When will that be?

A. That I do not know, sir.

Q. That you do not know. I am glad there are some things you do not know.

Have you had an economic study made in connection with the conclusions you arrived at? If so, who made that study and what was the nature of it?

A. I have not had one made, sir.

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[1851] By Mr. HANKIN:

Q. Dr. Jessel, what was the load factor which enabled you to calculate the annual peak for 1945?

A. Which exhibit is that?

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Mr. HANKIN. Yes. Exhibit 56.

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The WITNESS. What I did was, I took the figures undiversified and adjusted the annual peak for diversified figures, according to my judgment and experience. That corresponded to a certain load factor. I can compute that for you if you want to know what it is.

By Mr. HANKIN:

Q. Probably Mr. Gatchell's question is very clarifying. You did not use a load factor in determining the annual peak from the energy demand?

A. I had the undiversified totals there. I obtained the load factor on the undiversified basis and then if that appeared reasonable to me, or not, I used the figure I thought was reasonable for computing a diversified demand and then checked that back again to see whether or not it was anywhere close to the figure I used before.

Q. In other words, all of these figures are not figures of actual computation, but merely figures as to what appears to you to be reasonable, is that correct?

[1852] A. That is right, sir. The figures on diversified peak load——

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Redirect examination by Mr. Gatchell:

Q. Now, doctor, Mr. Hankin asked you some questions about the population trends, changes, and so forth. Do you know the population of Virginia at the present time?

A. No, sir; and I don't think anybody else does, either.

Q. What type of REA loads would be affected by population changes?

A. The rural residential load and urban residential loads specifically. The farm portion would depend more on economics than by population.

Q. It would depend more on economics, what do you mean [1853] by that?

A. The ability of a farmer to utilize mechanized equipment depends upon the type of farm he has, the type of product he produces and the type of market he has to market in. That a function of economics largely, rather than of population.

Q. You stated that you had not considered the percentage of saturation for electric irons, water pumps, electric water heaters and so forth, and so on. Why did you not do that?

A. When I first began this study the problem was to arrive at the loads which the eleven REA cooperatives might serve. Now, to make it a simple problem,

if they served nothing but farm customers then the method I considered using there was to go to the standard area approach or state approach, take the population, break it down between urban, non-farm urban, farm urban and farm population, then go to agricultural statistics and get the statistics for use per customer, in the various groups; go to electric merchandising and use the various appliance saturations—which are estimates, by the way—and then build up by a big, laborious method what the total farm load might be in Virginia for 1955.

But the consequence of that would be indefinite; what would it mean? The Virginia Electric and Power Company serves farm loads and so do the REA's. I would have to take a customer by customer canvass to see what the area is that each serves, what they serve now in the area, whether there is any [1851] overlapping, and by that approach I could not arrive even at a good farm use.

Furthermore, in exploring data in these form 12 (a) and 12 (b) reports, the REA systems are not pure farm service systems; some serve urban residential loads, some serve so-called rural loads, which are a combination of two types, the rural home which has no farm and the rural customer who has a farm and a residence. Some of them have just a farm there for pumping and other purposes. And the further fact that they serve both industrial and commercial consumers.

I considered that type of approach seriously for a long time and I finally found, after exploration of

data that I had, that I would not get an answer which I could conscientiously feel would be satisfactory.

Q. Were you trying to make an answer which would be satisfactory in support of the applicant or satisfactory for the purpose of determining the facts, or satisfactory for some other purpose?

A. At the time I made my study I knew of no position taken by Commission staff or counsel. I consulted with no one, I made my own study and used my best judgment and experience. I did not know what the answer would be and I had no reason for trying to select a figure.

Q. Did you try to shape your answer for some particular objective?

[1855] A. No, sir; I did not.

Q. You stated you did not consider the percentage of farms not yet electrified, or the steps that were being taken to electrify these farms. Why did you not consider that?

A. Well, not specifically, in that one of the problems on farms, the statewide figure, there is no way that I could arrive at as to what proportion might be served by REA cooperatives and what proportion by the Virginia Electric and Power Company, which also has farm customers, as reported in our annual reports. I considered the effect of saturation from the EEI bulletin of information but I could not identify the served portions specifically with lines of VEPCO or the REA cooperatives. There was no information I had available in the shop which, in a reasonable time, would permit me to do that.

* * * * *

[1856] Q. Do you recall Mr. Hankin's request yesterday for some arithmetical, geometrical, and logarithmic curves? Do you recall that?

A. I do, sir.

Q. You stated you did not use such curves in preparation of your testimony. Why not?

A. The arithmetical, geometrical, and logarithmic type of curves are merely arithmetical attempts, or, I mean, they are really prepared in these various forms for purposes of trying to estimate what the future may bring in the way of loads. The mere use of such figures, even coldly, would have called for assumptions on my part as to what to use as the increment for the arithmetical, the ratio for the geometrical, or the actual trending for the logarithmic curve.

I don't like that type of study, and I didn't know exactly how he wanted it made. That was the extent of my not understanding what he wanted.

Q. The studies that you have made in preparing, the results [1857] of which have been stated in your testimony, are they peculiar in this instance, have you made them in other cases, or what have you to say as to that?

A. I made similar studies. I think the last one I made was of the first Iowa Electric Cooperative. I made load studies, I think, going back to 1938 in the Bridge Canyon license project case, and the license project for the Feather River plants of the Pacific Gas and Electric Company. They did not always agree with me, but they found out later they were pretty good.

Q. Did you follow the same principles in these other cases?

A. The same principles. It is based on experienced use of available information.

* * * * *

Q. In order to answer the questions of Mr. Hankin regarding the number of electric irons, heaters, hay driers, and so [1858] forth, would it become necessary to have an extensive study of the economy of the region in order to arrive at a fairly good estimate?

A. It would help considerably, but even after I did that I still would not know what the average loads would be.

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[2455] Q. How soon do you expect to start delivering power from Buggs Island?

A. As soon as the first unit is completed. The present [2456] schedules anticipate completion of the first unit in the fall of 1952.

Q. What will be the capacity of this unit?

A. The first unit will be 12,000 kilowatts.

Q. When will the other units of Buggs Island come in?

A. The additional units are scheduled for completion at intervals of one month, and it is expected that the initial installation will be completed by December of 1952. We are requesting that the ultimate three units be installed as soon as possible, and we believe that the ultimate installation can be completed by the end of 1953.

Q. By that time how much of the power of Buggs Island and Philpott do you expect will be sold?

A. All of it.

[2457] Q. Are you familiar with the exhibit entitled "Capacity Available from Approved Plan of Roanoke River Basin Development to Meet the Power Requirements of Preferred and other Customers," and marked for identification as Exhibit No. 86?

A. I am.

Q. Was this exhibit prepared under your direction?

A. It was.

Q. How much of the power requirements of the preferred customers in the area will you be able to meet by 1955?

A. Our estimate indicates that by 1955 the preference agency load will be about 447,000 kilowatts. The preferred customers will be able to meet 291,000 kilowatts of this load from their own capacity, leaving 156,000 kilowatts to be supplied by the Southeastern Power Administration. However, at least 50,000 kilowatts of customers capacity is in old or otherwise uneconomical units which probably would be replaced by government firm power if it were available.

This makes a market for at least 206,000 kilowatts of government firm power which is, roughly, 40,000 kilowatts in excess of the capacity available from Philpott and the ultimate Buggs Island project.

Q. What will be the preferred customers' demand to be supplied by 1958?

A. Our estimates show that by 1958 the total power requirements of the preference agencies will be in the neighbor-[2458]hood of 509,000 kilowatts. Allowing again for 50,000 kilowatts of displaced customers' capacity, we should be required to supply 268,000 kilowatts. Buggs Island and Philpott will not be sufficient to meet the entire demand. The addition of Gaston will not meet the entire demand. The addition of Gaston and Roanoke Rapids would just about meet the demand without any allowance for reserve capacity in the hydro system. If Gaston, Roanoke Rapids, and Smith Mountain are constructed by 1958, we shall have approximately 291,000 kilowatts available to serve the load. This would leave

only 23,000 kilowatts of hydro capacity available for reserve which, in my judgment, is less than adequate.

Incidentally, the estimated thermal capacity of the preference customers amounting to 227,000 kilowatts will be adequate to provide the necessary support to our hydro system and assure that all capacity will be dependable on the load.

Q. What will be the preferred customers' demand to be supplied by 1960?

A. Our estimate shows that by 1960 the load requirements of the preferred customers will be approximately 551,000 kilowatts. Deducting the customers' estimated available capacity of 241,000 kilowatts will leave 310,000 kilowatts to be supplied from the government plants. This is more than would be available from the five projects already mentioned. However, if the Roanoke Basin development were completed by the construction of [2459] Leesville, Taber, Melrose, Randolph, Stuart, and Schoolfield the load could be supplied with 80,000 kilowatts to spare for reserve. This would be an adequate operating reserve, but would provide only a small margin for growth. Preferred customers capacity could still supply the necessary steam support.

Q. What will be the situation in 1970?

A. For that year our forecast is that the preferred customers load requirement will be 860,000 kilowatts. This load will not be met by the capacity available from the project in the Roanoke River Basin, together with the capacity owned by the customers.

Q. And all this does not include any sales to the privately owned power companies?

A. None of these estimates contain any element whatever of power requirements other than preference agencies.

Q. To what extent can the privately owned power companies benefit from these hydro projects, if all of the capacity is sold to preference customers?

A. The extent to which they can participate in and receive benefits from the hydro electric developments on the Federal projects depends entirely on the extent and the degree of their willingness to integrate, cooperate, and exchange their services with those of the Federal Government. The mere integration of the Federal facilities and their operation in conjunction with those of the private companies on a regional [2460] basis can render untold monetary benefits to the privately owned power companies without their receiving specific allocation of a single kilowatt capacity or a single kilowatt-hour of energy. In layman's language, by complete integration of all of the facilities within the Basin, Federal and non-Federal, there is afforded an opportunity either to place in cold reserve, or, at least on a minimum operating basis, many of the smaller, least efficient, and most expensive—from an operational standpoint—steam plants.

* * * * * *

[2580] Cross-examination by Mr. MOORE:

"Q. Will you turn now to Exhibit 85? It is an exhibit entitled "Generating Capacity and Estimated Loads of Potential Customers for the Roanoke River Basin."

A. Yes, sir.

Q. Will you now give us a list of the Federal agencies which make up the 88,440 of present installed capacity?

* * * * *

Q. And in answering that question, if you have the present loads, it will save time if you will just read that into the record.

A. You just want the Federal agencies?

Q. I am going to take up each one later for the first three groups.

* * * * *

[2581] Mr. MOORE. Yes, sir; 85. I just want a breakdown of those classifications.

The WITNESS. Here is my information on the Federal agencies, the Roanoke River Basin potential customers, that gives the information on their installed capacity and what their load was on the basis of the 1949 requirements.

By Mr. MOORE:

Q. So this would be as of the end of 1949?

A. I don't know what part of '49. Most of this information was obtained from the agencies themselves.

Q. If you will just be a little cooperative here, we will get along pretty fast with this. All I want first is just a breakdown of those Federal agencies and then we will take up the North Carolina municipalities and then the Virginia municipalities. Just give us a list.

A. I will be just as cooperative as I can. I will list the names here and read them off.

Q. All right.

A. The first one is the Naval Shipyard at Portsmouth, Virginia. The capacity is 30,000 kilowatt steam and their load is 22,500.

The Naval Base at Norfolk, Virginia, 8,000 steam; their load is 17,500.

The St. Helena Repair Shop, Virginia, zero capacity—— [2582] Hereafter, when I use the word "capacity," it will mean installed steam or internal combustion; the load is 600 kilowatts.

The St. Julian Ammunition Depot, Virginia, 600 internal combustion; the load is 600.

The Craney Island Fuel Station, Virginia, zero capacity; 1,000 kilowatts.

Defense Housing, Portsmouth, Virginia, zero capacity; 500 kilowatts load.

The Amphibious Base at Little Creek has two services, zero capacity in both cases; in one the load is 1,200; in the other the load is 700.

The Anti-Aircraft Training Center, Dam Neck, Virginia, zero capacity; 300 kilowatts.

The Naval Air Station, Oceana, Virginia, capacity is zero; the load is 500 kilowatts.

Naval Reserve Training Center, Fishersville, Virginia, capacity is zero; the load is 300 kilowatts.

The Naval Mine Depot, Yorktown, Virginia, zero capacity; 1,000 kilowatts.

The Naval Mine School, Yorktown, Virginia, capacity is zero; the load 300 kilowatts.

* * * * *

[2583] The WITNESS. * * *. Fuel Supply Depot, Penniman, Virginia, 1,200 internal combustion; 1,000 kilowatts of load.

Lighter-Than-Air Base, Weeksville, North Carolina, zero capacity; 600 kilowatts load.

Camp Lejeune, Jacksonville, North Carolina, 4,640 internal combustion; 7,500 kilowatts.

Marine Corps Air Station, Cherry Point, North Carolina, 10,000 kilowatts; 6,000 load.

Langley Air Force Base, Virginia, zero capacity; 3,000 kilowatts load.

Bethel Pumps, Langley, Virginia, zero capacity; 1,000 kilowatts.

[2584] Fort Monroe, Virginia, zero capacity; 1400 kilowatts.

Fort Eustes, Virginia, zero capacity; 1800 kilowatts.

Fort Storey, Virginia, zero capacity; 500 kilowatts.

Camp Lee, Virginia, zero capacity; 2900 kilowatts.

Camp Pickett, Virginia, zero capacify; 2500 kilowatts.

Fort Bragg, North Carolina, zero capacity; 1500 kilowatts.

Now, here, under the Langley Aeronautical Laboratory, Virginia, 10,000 kilowatts internal combustion. For this tabulation purpose, we have used their own peak load as being their 10,000 kilowatts internal combustion plus our tender under our memorandum of understanding of 70,000 kilowatts on peak. All of these loads are on peak.

Radford Ordnance Works, Virginia, 24,000 kilowatts steam, and there is no load at the Radford Ordnance Works at present.

By Mr. MOORE:

Q. That entire list that you have just read, as I understand it, when you add up the capacities, they add up to this figure of 88,440?

A. That is correct.

Q. And have you got the total as to what the present, for the 1949 loads amount to?

A. With the addition of the Langley Laboratory, as I have explained, that total is 156,700.

Q. That is assuming this extra 70,000 has been added [2585] to the Langley load?

A. That's right. It is not in at the moment, but it is definitely planned.

Q. Deducting that 70,000 leaves the actual present load?

* * * * *

The WITNESS. I don't know what their present load is on peak, except that it is materially less than this; I don't know how much.

Mr. GATCHELL. You are speaking of what station that you do know of?

The WITNESS. Langley Aeronautical Laboratory, Virginia.

Mr. GATCHELL. That is the one that you do not know what their present load is?

The WITNESS. I do not know what their present on peak load is.

Mr. GATCHELL. Do you know what their present off peak is?

The WITNESS. I don't know that, Mr. Gatchell. Maybe this figure will give you some enlightenment: I think they have the right to take something like

25 or 30 thousand kilowatts off peak; it may be more than that. It is a special load and the on peak part of it is not indicative of total requirements.

* * * * *

[2590] Q. Mr. Creim, just before the adjournment for the luncheon recess, I believe you had just completed giving us the list of the Federal agencies, broken down by names, which were included in that Exhibit 85, making up the total capacity kw. of 88,440.

I have, during the recess, added up the loads on these agencies as you gave them to us, and I understood those were the peak loads during 1949, were they, according to your records?

A. Yes. They were the loads—I wouldn't want to interpret them as being the maximum demand during the year 1949, but they are loads, peak loads, but may not be the maximum demand during 1949, because this data was not collected all at once. It might well be that if there were a tabulation of the maximum demand for that calendar year, it might be a figure somewhat different than this.

Q. But as to each individual one of the agencies it [2591] was the peak demand?

A. This is the best information we have available; that's right.

Q. The best information as to the peak during 1949?

A. That's right.

Q. After adding those up, I get the figure of 156,700 aggregate load. That seems to check approximately with your estimated load for those agencies for the years 1955, '58, and '60.

Are we correct in understanding that you have assumed no increase in load through 1960 for those agencies?

A. With the exception of this National Advisory Committee for Aeronautics, we have assumed that all of the agencies that are a part of the Department of Defense will remain in the status quo.

Q. Now, we understand from our engineers that have checked this during the lunch hour that the demand of the NACA during 1949, in addition to the 10,000 unit of their own that they have, amounts to 14,000, approximately; so that if you eliminate the 70,000 which you have included for the NACA and add back this additional 14,000, it amounts to 100,700 as the actual present load. Were you able to follow those figures?

* * * * * *

[2592] Mr. MOORE. That the load of the NACA is confirmed, as we understood it to be before lunch, that it is 14,000 plus their 10,000, or 24,000 is their peak demand during 1949, as I understand it.

* * * * * *

The WITNESS. Well, I don't know. We did not, for the purpose of preparing Exhibit 85, in connection with the National Advisory Committee for Aeronautics Laboratory at Langley, and with that one exception, we used in our estimate of load an amount which we are talking about and discussing with them as a load that they will have or anticipate having very shortly, of 70,000 kilowatts.

Now, I have no knowledge. I could find out by asking them the question, but I have no knowledge

of what their load was in '49, and we did not use it in the preparation of this exhibit.

By Mr. MOORE:

Q. At any rate, the 70,000 is not a part of their present load, so that you eliminated that. Then the present load would be 86,700, from your tabulation, plus whatever has [2593] been the demand of NACA on VEPCO; would it not? That certainly appears from your testimony.

A. It appears reasonable. I didn't follow every step.

Q. I say, if you eliminate the 70,000 as to NACA which is not yet in existence, that would leave, from your figures, 86,700 as the present load on all those Federal agencies?

A. All of them except NACA.

Q. That's right.

Mr. HANKIN. You mean the present load, or the load in 1949?

Mr. MOORE. 1949 is what I meant.

Mr. HANKIN. It is understood that does not disturb this figure for 1955 on Exhibit 85?

Mr. MOORE. Well, it does check out with his exhibit 85, except that he has added back in there the 70,000.

Mr. HANKIN. In other words, you can subtract any figure you want from the figures you have taken and add the same figure on and you will come out with the same result; is that what you want to bring out?

[2594] Q. If you eliminate the 70,000 from the 156,700 that your loads aggregated; you would wind up with a load for 1949 of 86,700, would you not?

* * * * *

[2595] The WITNESS. If we subtracted 70,000 kilowatts from the total that I have here of 156,700, you would have 86,700 kilowatts as the load without the National Advisory Committee for Aeronautics load.

By Mr. MOORE:

Q. Now, Mr. Creim, have you any commitments or any contracts for the delivery of power to any of those Federal agencies?

A. We have no contracts for power to any of these Federal agencies.

* * * * *

[2596] A. We have had discussions and correspondence with the Department of Defense. We haven't gotten into the discussion stage yet. We have had discussions, conferences, and negotiations with the National Advisory Committee for Aeronautics. We have as yet no completed, executed contract.

Q. Will you turn now to the next classification of potential loads shown on Exhibit 85, which is entitled "North Carolina Municipalities." If you have a list of those that you could file, it would facilitate this matter. If not, I will have to ask you to please give us the breakdown and as you go through the breakdown, give us the loads as to each one.

Do you have an exhibit you could furnish that would save us a lot of time on that?

A. I do not have any exhibit. I have a recapitulation of our working papers, the data of which was consoli-

dated and [2597] put in on this Exhibit 85 for the North Carolina municipalities and the Virginia municipalities.

Q. Would it be a convenience for you to file that list in the shape in which you have it? If not, I will have to ask you to testify into the record as to the details. I want to do it in whatever way would be most convenient for you.

A. As far as I am concerned, I could either give it to you or, if you want to give us the time, we will have a girl type it up and make some copies.

Q. You do have the list, do you not?

A. I have the list right here. I have a breakdown of the data upon which the information for the North Carolina municipalities, the capacity, and the Virginia municipalities, with their capacity, from which we got that information.

Mr. MOORE. I think it would facilitate it very much, Your Honor, if we could have that filed as an exhibit and have copies made of it and return your paper to you, if that is agreeable.

* * * * *

The WITNESS. That is one page, and this is another page. A lot of names and a lot of numbers.

[2598] Q. Go ahead and give us the list, now, that makes up the list of North Carolina municipalities whose capacity adds up to 110,900, as shown on Exhibit 85, and as you go through the list, give us the load, the peak load of each one of the municipalities for the most recent time you have.

A. All right. By way of preliminary, let me explain the basis for this information. The Roanoke

basin potential customers, the North Carolina municipalities. Some of these preference agencies have generating plants, and some do not, and our information upon which this tabulation was prepared is derived from the reported energy in 1947, from which we have ourselves made an estimate of the 1947 kilowatt load in these cities. So what I will be reading will be the name of the agency, the generating capacity, if they have it, and also our estimate of their 1947 load as we determined it from their 1947 energy.

The first one——

Q. Right there, before you pass on: Is 1947 the most [2599] recent information you have?

A. That is the most recent that we have on this grouping.

Q. All right, sir. Just go ahead.

A. The information varied in different categories, because, if I might comment by way of passing, some of these municipalities do not report their information in to the Federal Power Commission or other agencies.

* * * * *

[2601] The Witness. I will read a name and then three numbers, one column after another. That may expedite it slightly. The three numbers will be the generating capacity, the reported energy in 1947 in megawatt hours, and our estimate of the load in 1947, kilowatts.

By Mr. Moore:

Q. That is fine. Go ahead.

A. The first one is University of North Carolina; 2,500; 17,720; 4,000.

Apex; zero; 1,327; 330.
Laurinburg; zero; 4,195; 1,000.
Red Springs; zero; 1,997; 500.
Lumberton; zero; 9,098; 2,200.
Wake Forest; zero; 1,872; 500.
Louisburg; zero; 2,304; 600.
Benson; zero; 1,478; 400.
Fayetteville; zero; 37,494; 8,200.
Scotland Neck; zero; 4,400; 1,000.
Enfield; zero; 2,174; 500.
Windsor; 425; 1,500; 400.
Rocky Mount; 30,000; 53,094; 12,100.
Tarboro; 2,108; 8,922; 2,100.
Wilson; 27,500; 30,232; 6,900.
[2602] Farmville; 1,600; 3,670; 900.
Greenville; 15,000; 27,623; 6,300.
Washington; 8,250; 13,429; 3,100.
Grimesland; zero; 780; 200.
New Bern; 4,500 16,894; 3,800.
Belhaven; 514; 3,100; 800.
Smithfield; zero; 4,266; 1,900.
Selma; zero; 1,935; 500.
Fremont; zero; 1,014; 300.
Pikeville; zero; 290; 70.
LaGrange; zero; 835; 200.
Kinston; 18,500; 23,800; 5,400.
Elizabeth City; zero; 16,422; 3,700.
Hertford; zero; 1,592; 400.
Edenton; zero; 3,562; 900.

Of the generating capacity of the numbers I have given, 4,647 kilowatts are represented by internal-combustion engines; 106,250 kilowatts by steam; for a

total of 110,897 on this tabulation, which we rounded out to 110,900, I believe, on the report.

Q. Have you the total of the loads that you read? Do you have the total for that column?

A. No; I haven't. I don't have the total in megawatts or the total in kilowatts for those two years. I can get them for you, if you will give me an adding machine.

* * * * *

[2604] Q. Now, Mr. Creim, how did you proceed to work up the estimate of the estimated load aggregating 134,000 kw. for the year 1955, with respect to those North Carolina municipalities?

A. We used generally on all of these—this does not apply just to North Carolina—we used this same general set of criteria based on experience, what information we could gather from load forecasts and load studies that were made, not only in just Virginia, but other places throughout the Nation, and all of the figures in Exhibit 85 will reflect this type of analysis. Not all of it is from the same basis of fundamental data, we had to go to different places to get it, but we projected either '47 or '49 information or the best information we had and it was our judgment that we could, for the year 1950, have an increase in our load on an 8 percent basis, going back to whatever date line this original information was.

We projected 1951 and '52 in round numbers, set at a growth of 7 percent per annum compounded.

For 1953 to 1958—as a matter of fact, everything beyond 1952—is 6 percent compounded.

When you reflect all of those ratios through back on the historical data that we were able to obtain you get, generally, ratios of increase, as I said, from '47, '48 or '49, projected on up to the end of this period, that will vary from about 2.17 up to, in one case, 3.06; in a few cases 2.5.

[2605] For our estimate we have used the factor of 2.25 as a growth estimate for the period from the time we got it at the beginning until the last of our forecast.

Q. You mean running through to 1970?

A. Running on through, all the way through to the end of the tabulation. I guess that is 1958.

Historically we know these general things in the art, as far as it has gone: In a good many parts of the country for at least 30 years back the energy component of power has been increasing from around 6½ to 7 percent compounded annually. In some territories peak loads have gone as high as 25 percent increase in a year but for short relative periods.

A doubling in energy consumption and in demand every 10 years is one part of a development curve that has been fairly well substantiated in many parts of the United States. With the development of electrical equipment and the technology as we know it today it is not without the realm of reason that we will double our power requirements in the next 10 years. We might even triple them or quadruple them in the next 15 years. I am talking about peacetime operations now, no element of unstable international situations because that is not a part of this estimate.

After thinking it all through and taking all the basic data we had it was my conclusion that this 2.25 figure is [2606] a very conservative factor to use on the basic data that we have as it is today.

Q. You projected from the year 1950 out through 1970 using that 2.25 percent formula?

A. Generally speaking. For '50 we took 8 percent over '49. In some cases we had to project from '47 on to '49.

Q. So as I understand it you have used some general information and general formulas that you gathered from your broad experience over the country and this estimate is not based upon any detailed, critical study with respect to each one of these particular localities?

A. No, no; not with reference to each one. This area is too vast to have made any such study in a short period of time. A study of that kind, very frankly, pinpointing all of these localities, would not give you nearly as broad an estimate of the area—we are talking about a base now, what can we expect in these areas.

* * * * *

[2607] Q. You have not undertaken to obtain from the persons who are in charge or who are responsible for the operation of those municipal plants, their estimates of their load growth, have you?

A. Yes; we have. I have had conversations with several of these larger municipalities, with their superintendents. They want our power and they have submitted—I don't happen to have it here but they have submitted to us in a general way what their

present load requirement is, what their load is, what their plant installations are and what they would like to buy from us. We have not as yet been in a position to take any action on their requests.

Q. Which ones have you had such negotiations with?

A. We had a group of them coming in that represented these larger ones, Rocky Mount, Wilson; I think the man from Kinston was there. There was a party of five or six people came in at the time when the American Public Power Association had their convention here last year. They came to the office and we had an evening meeting set aside for all of these municipalities, Virginia, North Carolina, all of the South- [2608] eastern states, all 10 of them.

At that time these people submitted for our information a few sheets of paper giving us their requests. I explained to them at the time that we were going to formally submit an application for power to each one of them and part of that information is part of what I have read here.

Q. But there has been no critical study made, so far as you know, by each one of these municipalities in respect of its estimated load covering years such as you have indicated on this exhibit, that is, for the years '55, '58 or '60, something of that kind?

A. I don't know just how they have broken their studies down but all of these people I have talked to, and I have talked to a great many of them, all of them want power. All of them are conscious of the fact that their load is growing and it is growing rapidly. They are all conscious of the fact that they are en-

titled to preference to Buggs Island power and they want their fair share of it, and they have all projected their loads, some of them more optimistically than others.

Q. All I want to get in this connection right now is: To what extent have the figures that you have used on this Exhibit 85 been the result of any studies made by the localities themselves?

A. Only insofar as they gave us the basic data as to [2609] their past, and in some cases we have compared our estimate with theirs, but we have used our own estimate throughout in this, our own judgment.

Q. Now, is it not true that in any negotiations you have had with these municipalities you have assumed that you would control the resale rates under which they would sell electric energy in the municipality?

A. No, I haven't made any such assumption as to control of their resale rates.

Q. Do you intend to do that?

A. Not what you have said. We have an intention to do something different, if that is what you are meaning.

Q. What is it that you do intend to do with respect to their retail rates?

* * * * *

[2610] The WITNESS. We expect to see to it by way of contract that the provisions of Section 5 of the Flood Control Act of 1944 are complied with. One of the provisions is that power shall be sold at the lowest possible rates to consumers, consistent with sound business principles. I may not be specific as to the definite wording.

If power is procured by any of these municipalities—and I don't join in your fear as to my ability to market it—the provision for passing on benefits from federally produced power to the ultimate consumer will be complied with.

Now, the specific manner in which that is accomplished I am not prepared to say at the moment.

* * * * *

[2615] Q. Now, I ask you this: In the discussions with the city representatives of the City of Rocky Mount and the City of Wilson, North Carolina, have you not found real difficulty and objection on their part to these resale provisions that you propose to include?

A. Quite to the contrary. My only meeting with them was right here in Washington, and it was in a room in the Shoreham Hotel at which some probably 40 or 50 or 60 were present; the managers, superintendents, and councilmen of all these various cities were present. We had a long discussion. There wasn't a single man there that I know of that had any real fault to find with these provisions of Section 5 of the Flood Control Act of 1944. Some of them admitted that they had a rather difficult local problem to handle. I am confident myself that we will work it out in time. It cannot be done overnight. No power contract can be negotiated overnight.

[2616] Q. Do you know whether those very cities that I am referring to are presently negotiating with the Carolina Power and Light Company for extensions of their contracts?

A. I don't know. I haven't talked to them about that.

Q. What is the price that you propose to offer to these municipalities in North Carolina?

A. We don't know that. The manner in which they will receive service, and they can receive service in half a dozen different ways, the planning has not gone that far.

Q. Have you a contract for the sale of any Buggs Island power to any one of the North Carolina municipalities that you have given in this list?

A. I have answered that question already, and I have said "No, we have not."

Q. Now, will you turn to the next classification of Virginia municipalities, and will you just give us the information as to the breakdown of those municipalities, giving the three items that you gave as to the North Carolina municipalities; that is, the kw. capacity, the peak load, and the kilowatt hours?

* * * * *

[2617] This is the Roanoke Basin potential customers, Virginia municipalities.

By Mr. MOORE:

Q. Are you using the year 1947?

A. This is the same criteria we had before.

Q. Oh, yes; I see. All right.

A. Bedford; 970; 14,000; 3,200.

Blackstone; 1,260; 5,459; 1,300.

Culpepper; 1,221; 3,249; 800.

Danville; 12,200; 40,945; 8,700.

Danville also has 10,100 in hydro.

Franklin; zero; 5,529; 1,300.

Harrisonburg; 3,500; 18,969; 4,300.

Harrisonburg also has 780 kilowatts in hydro.

Martinsville; 1,300 in hydro; 15,151; 3,400.

Radford; 800 in hydro; 15,294; 3,500.

Salem; zero; 5,989; 1,400.

Virginia Polytechnic Institute; 3,625; 8,059; 1,900.

That total is 35,756; hydro, 13,950; internal combustion, 2,481; steam, 19,325.

I don't have the totals for those other two columns on this tabulation, either.

Q. Will you just briefly tell us how you arrived at the load estimates as shown on Exhibit 85 as to those Virginia municipalities? First, take the 58,000 kw. load [2618] estimate for the year 1955.

A. This estimate was obtained in exactly the same way I just explained for North Carolina. There was no variation in method. We used the same principles and the same factors for increasing the load estimates.

* * * * * *

By Mr. MOORE:

Q. You have no contracts with any of those municipalities, have you?

A. I said now for the third time we haven't any contracts except for the two that were introduced by identification yesterday.

Q. That brings us up to the next one, which we have dealt with at length, and I will try to be very brief about this item.

[2619] The Old Dominion Electric Cooperative, you show there on Exhibit 85, has a capacity of 36,350. I assume that is intended to represent that their present capacity is 6350 kw. because you have included

there a 20 or 30 thousand unit which is proposed.

A. Number two—I don't know what you call that little flag there—number two down at the footnote says it includes 30,700 kilowatts of steam not yet constructed, but for which funds are available, and 250 kilowatts of hydro. Now, part of the Old Dominion, or some of the members of the Old Dominion have generating capacity in their own right, and that was all lumped in here together. It includes the proposed steam plant that Old Dominion intends to build.

Q. Now, will you give us the breakdown of the Old Dominion Cooperative, as to the members there, and their loads which you used?

A. I don't have that. We didn't treat the Old Dominion or—and this also goes for the Eastern North Carolina groups—we didn't treat them as individual cooperatives, because our discussions with their engineers are of the federated cooperatives, the ones that are going to engage in the generation and transmission.

These figures reflected here for 1955, '58, and 1960 are our adaptations of their data and the Rural Electrification Administration data as to what can reasonably be expected to [2620] be the load of the group of the Old Dominion Electric Cooperative and the Eastern North Carolina.

Q. What was the load that you assumed presently to exist for the Old Dominion Electric Cooperative?

A. I don't have that data here for either of those two groups.

Q. Can you give us the formula or principle on which you arrived at 59,000 as the load for 1955?

A. Well, we used the same basic method. In other words, we determined as nearly as we could the total power purchases plus power generation of the existing REA cooperatives. The latest information we had, I think, was out of the REA Co-op report for 1949, and projected them forward, both for that group and Eastern North Carolina, on exactly the same basis as we have for the Virginia municipalities and the Carolina municipalities; a factor of 2¼ applied progressively is the same.

Q. So this was your own estimate, based upon that formula rather than taking any estimates furnished by the cooperatives?

A. Well, there is virtual agreement between the co-op engineers and ourselves on what this picture looks like for the future. There are small, minor variations, but some people are a little more conservative, some might use 2½, others use 2¼, you might find someone who is real optimistic [2621] and say a factor of 3.

These are our estimates.

Q. I assume you applied the same methods in the treatment of Eastern North Carolina?

A. Absolutely the same.

Now, there well could be—I might make this explanation for the record—there well could be some cooperatives in Virginia and some cooperatives, I am certain that there are possibly some cooperatives in North Carolina that may not be included in our estimates. We have only included that grouping that

is a member of the Old Dominion Electric and those that are members of the Eastern North Carolina, along toward the border line of the states there might be some isolated REA's that are not a part of this picture or a part of these estimates.

* * * * *

[2623] Q. On page 2455 of the transcript, you answered a question as to the power requirements in the Roanoke River basin by this statement:

"The exhibit ——"

That is this exhibit we have been discussing.

> shows our estimates of what in the years indicated the demand for power will be on the part of these preferred customers upon the Southeastern Power Administration for power service from the Roanoke River basin.'

In making that statement, are you not assuming that all of these municipal agencies, and others in this group of customers, will not, over the next 20 years, build any further capacity for their own use or contract with any utility company for their increased power requirements?

A. I have assumed in the light of my experience these municipalities and cooperatives in Virginia and North Carolina will not be unlike the municipalities and the REA cooperatives in other parts of the United States where I have had experience. And, by and large, every one of them wants to get its fair share of its entitlement to power under Section 5 of the Flood Control Act of 1944, or there are several other Federal statutes that give this preference on other types of projects.

It well could be that there will be an isolated agency, an isolated city, an isolated cooperative, that for one reason or another we cannot get together on contract terms, or that [2624] we cannot get together on the economics of service. I can visualize such a thing as that.

But I would say it is my judgment over a period of 20 years, if you are going to project it that far forward, that every one of these agencies will make an honest endeavor to get their fair share of power.

Q. At any rate, you have assumed they would remain static so far as any further additions to their capacity is concerned?

A. I have assumed that the economics of the situation for the future will not be any worse than they are now, and that is that power produced in these multiple-purpose hydroelectric power projects delivered to the customer will be cheaper than the customer can either provide that power for himself through steam or his own hydro, or purchase the power from some other agency.

Q. Now, just in order that we may be sure to get your thinking on that point, I would like to ask you this question: Take, for example, the initial installation at Buggs Island, which I believe the record shows to be 108,000 kw. That figure checks with your understanding, doesn't it? The first part of the installation.

A. It is 208,000 or 204,000.

Q. Ultimate?

A. That is right.

[2625] Q. Now, do we understand that after this 108,000 kw. installation, which is the initial installation which was recommended by the Army Engineers, has been completed, that you would conceive it to be a part of your duty as Administrator of the Southeastern Power Administration to undertake to obtain increase in that capacity in order to meet preferred loads in the area?

A. I don't know that I completely understand what you mean by my responsibility. It is my responsibility, as I interpret it, to market the surplus power that is available at Army projects, and as these Army projects come in and power is made available, it is my responsibility to market it.

As to projecting that into the future as to what will happen, I can only cite my judgment on the matter, and that is that the same thing will happen on the Roanoke River basin, on the Savannah River basin, on any one of the twelve basins that are in the domain of Southeastern Power Administration, that the same thing is going to happen there that has happened in the Pacific Northwest, that has happened to the Tennessee Valley Authority and other places where this hydro power has been developed.

None of it will go to waste. It will all be used, and the local interests themselves—I won't have to do anything about it—the local interests themselves will be in here in Washington beating down the Avenue to their own Congressmen [2626] and their own Senators, just like I have witnessed at one appropriation hearing after another, each one clamoring to have more and

more multiple-purpose projects built in their own backyard.

I don't know whether that answers your question, or not.

Q. I don't think you have answered my question. I will put it another way, and I want really just a straightforward answer to the question and I will leave the question alone then.

We all agree that the initial installation approved for Buggs Island contemplates 108,000 kw. capacity. You have testified in regard to negotiations that you are carrying on with regard to the possible sale of 35,000 of that capacity to the Old Dominion Electric Cooperative subject to certain conditions.

A. Yes.

Q. Similarly, you testified regarding the sale of 30,000, approximately, was it not, to the North Carolina Cooperative?

A. Right.

Q. That is 60,000. You have also testified in regard to the possible sale of 150,000 to the NACA.

A. Right.

Q. You have also testified regarding these municipal loads.

A. Right.

[2627] Q. Now, I want to get a simple answer: Do you conceive it to be a part of your duty in connection with these so-called demands from preferred customers, to undertake to procure additional generating capacity?

A. At Buggs Island?

Q. Yes.

A. Yes, I have already done so. I testified, or I think I testified yesterday—a lot of this subject matter has been discussed in dozens of places by me in the last few days—the day before I got to Washington, last Friday, I personally called on the District Engineer at Norfolk, who has cognizance of Buggs Island, and discussed with him his present work program and his present schedule and the problems associated with getting the three additional units at Buggs Island on the line.

Q. Your answer now has indicated what I thought you would have to say. Do you not recognize that it is the duty of the Chief of Engineers to make recommendations to the Congress regarding appropriations for additional generating capacity?

* * * * * *

[2628] A. The Definite Project Report for Buggs Island very definitely provides for six large units and one small unit, and I consider it a part of my responsibility to advise the District Engineer, and the Division Engineer, and the Chief of Engineers, if necessary, as to what the potential market is and the likelihood of the marketing of that power, because the responsibility for pay-out, aside from anything else in the Flood Control Act, the responsibility for pay-out rests with the Secretary.

Now, you may not agree to that conclusion, but you are asking for my judgment on it.

Q. I was just trying to find out what your thinking [2629] was on the matter.

You do recognize that it is the responsibility of the Secretary of the Army, and more particularly the Chief of Engineers, to make recommendations regarding additional generating capacity, do you not?

A. I think anyone can make recommendations for additional generating capacity. It is the responsibility of the Corps of Engineers to plan and to construct the projects. Anybody could make a recommendation.

Q. It is their responsibility to make a recommendation to Congress as to whether or not funds should be appropriated for additional generating capacity, and not that of the Secretary of the Interior, is it not?

A. I don't want to debate that issue with you.

* * * * *

CHIEF PRESIDING EXAMINER. Is that your understanding, Mr. Creim?

The WITNESS. My understanding of what has happened in connection with this same Act, I have been up in these halls of Congress so many days I can't count them, and every time there is an appropriation hearing for McNary, for Grand Coulee, in the old days for Bonneville when I was there, for Central Valley, all of these projects, everybody goes to [2630] Congress and makes recommendations for the building of the power plants.

I have yet to find any instance where the grass roots people or the Department of the Interior or the Corps of Engineers or the Congressmen themselves don't come in from their own localities and they make requests on the appropriate subcommittee: "We will appreciate your making the appropriation as

recommended by the President." If I have heard that once, I have heard it a thousand times. I don't think the picture is going to be any different on the Roanoke River Basin.

As a matter of fact, it wasn't any different this last year. The people came in from all over.

Mr. MOORE. If you think that is responsive to my question, I will leave it right there.

The WITNESS. That is the best answer I could make.

* * * * * *

[2633] Q. I have just one further question in this connection and I will preface it with this: I have no desire to ask you to negotiate a contract on the witness-stand——

A. Well, I wouldn't do it.

Q. I don't intend to ask you to do it. But I am now going to refer to your testimony at pages 2459 and 60 where, in answer to Mr. Hankin's question with respect to the point as to whether privately owned power companies can benefit from these hydro projects which you have been discussing, if all the capacity was sold to preference customers, you said:

> The mere integration of the Federal facilities and their operation in conjunction with those of the private companies on a regional basis can render untold monetary benefits to the privately owned power companies without their receiving specific allocation of a single kilowatt capacity or a single kilowatt hour of energy.

[2634] Are you there referring merely to a so-called interchange of power agreement or are you speaking of firm power commitments?

A. Neither. I am talking about the broad, over-all concept of system integration, something that may be new out in this part of the country, I don't know. I don't know enough about your operations but it is something that has been going on in the western part of the country for a good many years now.

If I can take a minute I would like to state this.

Q. Yes, I would like you to go as far as you want to go. I have no desire to press the point but I think you have left it rather brief, to say the least.

A. I assume that maybe your engineers might know what I am talking about, but briefly here is what I have reference to, and I will make it specific with reference to Buggs Island.

The Buggs Island Power plant can be operated in any one of a dozen different load patterns, or you might have a thousand different load patterns, depending upon a lot of circumstances.

Now, if it were all owned—get that word—if all of the power facilities, including Buggs Island, were owned by one entity and I don't care whether it would be public or private, good, prudent dispatching and operation of that [2635] system would be to operate the Buggs Island reservoir in such a manner that you would get the maximum utilization out of the water.

Now, we don't have that nicety and we do not have the situation from an operating standpoint where one person calls all the dispatching signals, tells which power plant to come on the line and which one to go off. We have a half dozen or a dozen utility agencies in North Carolina, South Carolina, Virginia and that associated area, each one operating in his

own little backyard and each one having one or more ties with his neighbor. You do not have complete integration as though it were owned and operated by one entity.

Here is what can be done with Buggs Island power, with the Buggs Island investment, that is the best way to put it:

It would be possible for a power company that is predominantly steam—that is what we have in that area—to make contractual arrangements—and the pattern for this is the day-to-day contract of the Pacific Gas & Electric Company with the Central Valley Project in California, and this actually exists: Each day the dispatcher of the hydro system tells the dispatcher of the steam system as to how much energy or how much water, in other words, he feels obliged to pass through the plant during the 24-hour period, and within certain minimum and maximum limits that exist on all of these hydro projects becauses of fish, navigation, recreation, safety of the [2636] public and things of that kind, the steam dispatcher says, "Well, if you can give me that power in this manner I can leave this old coffee-grinder—" and I will use the language of the layman—"this old antiquated steam plant off altogether today, we don't even have to turn it if I know that you will let me have that power between these hours."

"Fine, it can be done."

Also, at midnight or after, between 12:00 o'clock and 6:00 o'clock or any other time the more efficient steam units of the steam agency are putting power into the system and then coming back to carry load

of the hydro agency, if the hydro agency has load.

That is one way.

Another way is for the hydro dispatcher to say, "I have so many kilowatt hours available today." The steam agency says, "Fine, I'll buy them, but don't generate them. Here's your payment for it but you keep that water in the reservoir. This is the Fourth of July. We don't need any power today. Tomorrow is the Fifth of July and we don't need any then, but we want this around Christmas time."

So, by a simple contractual relationship for storage of energy at the top of the layer, that energy which is bought and paid for in July is delivered to the steam agency in December, with a very nominal fee for storage. And during that period the steam agency which normally would have to put on [2637] one of its older, less efficient steam plants, can get by without doing that at all. The older, less efficient steam plant stays off the line; the same amount of energy integrated into the total system gives benefits to the steam agency without them having the right to buy a single kilowatt or a single kilowatt-hour on a firm basis.

Now, I can sit here all afternoon—it is a hobby of mine—I can sit here all afternoon and put most of you to sleep on dreaming up and actually putting into operation the day-by-day, practical operating consequence that comes about when you do integrate all of the facilities. And, furthermore, when you have transmission facilities capable of moving this power to the places and in the directions in which it is needed.

Q. You were there speaking about a joint operation with a maximum amount of friendly cooperation, instead of operating entirely independently, were you not?

A. I don't like this word "friendly" because to me it imposes a gift. You can have the maximum amount of contractual relationships that are definite and specific, where every party to the relationship benefits and profits by this joint integration. In other, arithmetically this isn't correct, you cannot add two and two together and get more than four out of it, but you can with these hydro projects, by doing certain things, increase the utilization so that your benefits [2638] are more than two times two.

One little element that I did not mention. This comes from the hydro agency. Mere ability to withhold releases from the reservoir would allow the hydro agency at a later part of the year to get more kilowatt-hours per acre-foot out of this water than if it had to release it earlier in the year, thus operating the plant for a long period of time at a lower elevation.

I can sit here and enumerate them all afternoon.

Q. Now, out of such cooperation as that and having in mind that the Buggs Island project is shown by the Army Engineers to be most effective on a 23 percent load factor, the Federal project at Buggs Island would obtain through such a contract the firming up of the Buggs Island power through the steam system, and also the opportunity to utilize transmission lines of the private system without having to construct such transmission lines, would it not?

A. Well, there are two parts to your question, let me take them one at a time.

The first part with reference to steam; Buggs Island hydro, in my judgment, can be firmed up—and I use that word in its broad sense—over the dry cycle, that is what it means. It can be firmed up either with preference agency steam, and there is enough preference agency steam in this area to do the job, or with private agency steam. I don't know [2639] at the moment the relative economic balance of one type of plant against the other.

Now, the second part of your question about transmission. That 208,000 kilowatts of installed capacity will be at Buggs Island sooner or later. I say sooner or later, either '52, '53 or '54. It is just a matter of time and it will all be in there. That 208,000 from a practical operating standpoint is at least 225,000 or maybe 230,000 kilowatts. From experience all of these installations have overload capabilities. If you operate the plant properly you can take advantage of them.

There is no transmission system that I know of in the vicinity of Buggs Island that will take 230,000 kilowatts away from it to these respective load centers. If there is I haven't seen it and I have been around the territory just a little bit.

So, somebody has got to provide transmission facilities to take Buggs Island power to market.

[2640] Q. Now, in view of what you have just said, will you tell us whether there is every economic reason to believe that if the applicant here constructed the Roanoke Rapids project as proposed, that a mu-

tually advantageous contract in connection with Buggs Island could not be worked out?

A. I don't know.

Q. The economics seem to point in that direction, do they not, that it should be possible to work out a mutually advantageous arrangement?

* * * * *

The WITNESS. I said I don't know, and I was going to amplify why I don't know, because there are many factors involved, as you can appreciate, in this whole power problem that we have here, and whether or not the Administrator of Southeastern, or the Secretary, it doesn't make any difference, with the applicant in operation on the river, or any of these factors, I can't tell whether we can work that out now, or not; I don't know.

[2641] Up until yesterday morning I had heard of Mr. Holtzclaw and Mr. Barnes; I never knew the gentlemen, had never talked to them. I don't know what they are willing to do. I know what I am willing to do, but I don't know what they are willing to do, and it always takes two people to make a contract.

* * * * *

By Mr. MOORE:

[2653] Q. In order to assist Mr. Whitehead I would like, if I may, Mr. Creim, to direct your attention to Exhibit 85 again. You have given us the names of the Federal agencies which you included in that first group as having 88,440 kw. capacity. Did you have the actual load in kilowatts for any one of these Federal agencies for any year?

A. The actual load?

Q. Yes, sir.

A. Yes.

Mr. MOORE. Isn't that what we asked you for?

The WITNESS. That is right.

By Mr. GATCHELL:

Q. You gave us the load requirements on the basis of 1949, the 1949 load requirements. Did you have for any of those the kilowatt hour use for any agency?

A. I don't think that information is available on this particular group of defense agencies. It may be in our files over there but I don't think so.

Q. Did you use it in preparing your estimate shown [2654] on Exhibit 85?

A. It is the energy you are talking about now?

Q. Yes, sir; the annual energy consumption by any one of these Federal agencies.

A. No. On the Federal agencies we took the present load as it existed, the information we were given by the Department of Defense—some of it was in the files for quite a while—and drew the conclusion that that was going to be the status quo for some time, pending some change in our peacetime operations.

Q. Now, lacking the annual energy consumption figure did you have any load factor for any one of these Federal agencies based upon their prior operation?

A. On their prior operations?

Q. Yes, sir.

A. I am sure there was some information on their prior operations, that is, during the war and years previous to this.

Q. That you used?

A. No; we didn't use them. I am talking about the Federal agencies now.

Q. Yes, sir; just the Federal agencies.

A. We didn't use them because we were trying to project forward in our load estimates the status quo as far as demand is concerned.

[2655] We also were advised by several of the people we talked to in the department that the future status of some of these Federal agencies was still not determined.

Q. Did you contact any of these Federal agencies as to their estimates of their 1955 load?

A. We didn't quite put it to them that way. We talked to the people in charge of their utility departments and asked them what their views were. Generally speaking this is the story that we have projected. On a peacetime basis they don't anticipate any increase in their demands.

Q. You give the 1955 estimates as 157,000 kw. for these Federal agencies.

A. That's right.

Q. Did you get those figures which would make up the 157,000 from any Federal agency?

A. That is this group here that I have given you; they all came to us from those agencies.

Q. I understand you to say that you obtained their 1949 requirements and their installed capacity.

A. That's right.

Q. Now, I am asking you about 1955.

A. From '49 on all of these estimates are our own.

Q. Are your own?

A. That's right.

Q. And they are not those of any Federal agency?

[2656] A. That's right.

Q. In preparing your estimates for 1955 for these Federal agencies did you make any computation of the annual amount of energy that would be supplied to these Federal agencies either singly or as a group?

A. I did not. I don't know whether my staff did, or not.

Q. Did you use it in preparing your estimate as shown on Exhibit 85?

A. No, we did not.

Q. Did you have any estimated load factor for the National Advisory Committee for Aeronautics for the load which you estimate will be supplied to them?

A. No. We are approaching it a little differently. We are approaching it on the basis of their requirement for on-peak demand and their requirement for off-peak demand.

Q. Can you give any estimate of the load factor for the on-peak demand?

A. No, but if you will just let me finish I will tell you just what we did.

We received from them the information of their expected on-peak demand and their expected off-peak demand and we are working with them now in a determination of what the energy requirements of the laboratory will be month by month, and on

an annual basis, within the limits of 70,000- and 150,000-kilowatt demands.

[2657] Q. Now, as far as your studies have presently gone have you arrived in your own mind at any general figure as to the load factor to be anticipated for the on-peak demand for this NACA load?

A. No; because from our marketing standpoint it would be immaterial as to what the difference between the on-peak and the off-peak was. We have been discussing with them the total energy requirements for the operation of the laboratory on a monthly basis.

Q. The total energy requirements on a monthly basis would show you somewhat the load factor to be anticipated in serving that customer, would they not?

A. That's right.

Q. Have you any idea as to what that load factor might be?

A. At this moment I can't tell you what the final negotiation will be.

Q. I understand that you cannot and I don't expect you to do something that you cannot do, but can you give us some general idea? Is it going to be a high load factor?

A. Oh, no. I can tell you it will be a low load factor on the basis of 150,000 kilowatts, and somewhat higher if you put it on the basis of 70,000 kilowatts. The operation of the laboratory has a low annual load factor operation, if you take the off-peak demand as a basis. It would be about twice [2658] as high if you take the on-peak demand.

Q. When we say "low" and "high" those are relative terms.

A. I would say something less than 20 percent.

Q. Would be low?

A. Yes. As loads normally run it would be less than 20 percent.

Q. Would that be less than 20 percent for the off peak?

A. I can't tell you, Mr. Gatchell, how they intend to operate the internal mechanism of the laboratory. We haven't gone into that as it is of no concern to us in the marketing of the power. We are concerned with the total amount of energy they are going to take from Buggs Island during any one month and we haven't come to an agreement on the limits on that.

Q. Have you come to any idea as to the rate of buildup in their load? Will that come on suddenly or will it come on gradually and, if so, for what period of time?

A. That is one of the matters that we are discussing. Their present contract has some very severe limitations from their standpoint—I am just passing on their comments to us—in that they cannot pick up energy, they cannot pick up capacity greater than so many kilowatts per minute. I don't recall just what the rate is.

It means that their starting up period is quite long—[2659] this is their comment. We have had one discussion on the rate of build up. It isn't the rate of build up, it is the rate of putting starting current in-rushes into the system from our standpoint. We haven't reached any conclusions on it other than this, that we are satisfied that we can allow the laboratory to

start up much more rapidly with their new installations than they are required to do now.

I can just toss these two figures at you—well, we will have to reserve that because a certain amount of this information I am not privileged to pass out other than to say this: That with a hydro system with a capacity such as we have and the ability of the wicket gauge to open up more rapidly we won't have the limitations at starting time in serving NACA under a hydro system that they now have under their steam system.

Q. How is it with respect to the dropping of that load? Does the same problem there obtain?

A. I don't know whether there are any requirements in their dropping off of the load.

Q. Have you considered that?

A. Yes; we are considering it.

Q. Have you considered at all the effect which that load might have on the releases of water downstream from Buggs Island?

A. Yes; we are considering that.

[2660] Q. Would you regard this National Advisory Committee load as a firm load?

A. For a long duration do you mean?

Q. You have used "firm capacity" in your discussions here.

A. Yes; but I never heard of the word "firm" as applied to an agency.

Q. All right. Will they have a right to call upon you at any time?

A. Oh, yes; yes.

Q. And if they call upon you during on-peak hours you would limit it to 70,000 kw. and off-peak you would limit it to 150,000 kw.; is that right?

A. That is their general plan.

Q. Is that a firm commitment as you would understand it to make that capacity available to NACA?

A. That's right, with a few other limitations as to the duration which those loads can stay on the system from an energy standpoint.

Q. I understand it, but would that have anything at all to do with whether it is a firm commitment?

A. It is a firm commitment on our part.

Q. It would be?

A. And it is contemplated that there would be a limitation on the amount of kilowatt-hours they can take from our system during any one month.

[2661] Q. So far as they are concerned, would you regard it as good business judgment on their part to undertake any agreement unless they were assured of the supply?

A. Well, I just don't know what you mean by assured of a supply.

Q. Unless they could count on having that capacity delivered?

A. If we contract to deliver it to them, we will deliver it.

Q. You will have to deliver it?

A. That's right. By way of passing, I think the service from Buggs Island power plant will be of the same kind and quality as the hydro service from any other Federal establishment.

Q. I would rather ask you questions about that when I get to it, if I may.

As I understand it, some of these Federal facilities are in the Norfolk area; is that right?

A. That's right, quite a few of them are.

Q. Yes, sir. But some of them are not; for example, Fort Bragg, North Carolina. How would you get the energy to these Federal facilities?

A. Some of them we may have to build direct. A lot of them, service to a lot of them, how we do it will depend a little bit on the attitude of the privately owned operators [2662] in that area now.

Q. Had you, in your plans, considered the construction of transmission facilities by your agency to serve all of these Federal agencies?

A. Not to serve all of them; no.

Q. Have you considered——

A. We haven't gotten to that part of our planning as yet.

Q. Had you considered the supplying of energy to the Radford Ordnance Works in Virginia, for example, as being over your own facilities?

A. No, no; I don't think that is going to be necessary. No one is supplying Radford Ordnance Works. That is a generating plant now which doesn't consume any energy.

Q. But you listed that as one of the Federal agencies as a potential customer.

A. As potential capacity. If you will look at the figure, I think you will see we had zero load at Radford.

Q. But as I read Exhibit 85, it said, "Generating capacity and estimated loads of potential customers of Roanoke River basin."

* * * * * *

[2663] The WITNESS. If you will recall, I spent a good many minutes here reading off some places and names and quantities. The Radford Ordnance Works, Virginia, was the last one that I read under the caption of "Roanoke Basin Potential Customers" for both the columns of capacity and load. I indicated there was 24,000 kilowatts of steam at Radford, and at the present time the load was zero, the plant is shut down.

By MR. GATCHELL:

Q. You say no load at present.

A. No load at present.

Q. Then it would not figure in the estimated loads for 1955?

A. That's right, but it did figure in the capacity available in 1955.

Q. Is that capacity at Radford leased to any public utility company of which you know?

A. The Radford plant is leased and under my understanding I was definitely told of that matter by a representative of the Department of Defense, on a recapture lease, subject to future negotiation.

Q. Are you personally familiar with that lease arrangement?

A. No; I have never seen the lease.

[2664] Q. There are a number of these loads which obviously are very small on the list, as you gave them

this morning. How would you propose to serve those small loads?

A. That would depend on a good many factors. A very simple way would be to serve them through wheeling or exchange arrangements with existing utilities. That probably would be the simplest way.

Q. And, of course, you have no such arrangements yet?

A. We haven't talked to anybody about it yet, and we may not get any such arrangements, even after we do talk. That is one possibility.

Another possibility is service off of our own lines. We will have to appraise the situation and evaluate it at the time each one of these come up.

Q. Would that be economical in the case of all these Federal agencies you have listed?

A. By individuals?

Q. Yes, sir.

A. There are undoubtedly some of these so small and in such remote places that it would be more costly to the Federal Government to provide individual, isolated transmission lines to that one agency, if that was all that was involved, than it would be to continue paying the present tariffs.

Q. Can you tell where those agencies would be as you [2665] now understand it? How many are in that category and where are they?

A. Well, these are all scattered. They would have to be considered also in the light with service to the REA cooperatives. If there happened to be some of those loads in the area, arrangements might be made one way or the other. Either we would build

the lines or have wheeling arrangements someplace else.

Q. That, again, is a problematical matter?

A. Let's use the word "problematical" as a problem for the Administrator. I don't expect it is something that may never happen, and I don't expect that we will solve this problem 100 percent.

Q. Now, you have the second group of North Carolina municipalities. In preparing your estimates for these North Carolina municipalities, did you use any past records of capacity or use of each one of the municipalities that you named?

A. We did not go back of the year '47.

Q. Did you use that year alone?

A. My recollection is that that is all the information we were able to gather together, or all that we did gather together. We used that as the base line and projected our loads forward.

Q. You used that as your basing point to project it [2666] first in 1950; was that the first year?

A. That's right.

Q. And then '55, '58, '60, and 1970?

A. That is correct. We did, in a few instances, have, and I think we still have, some information on some of these cities in years going back, but we did not back up on it.

Q. What do you mean by you didn't back up on it?

A. We didn't give too much credence to the loads in '48, '47, '46, '45, and '44, and during the war periods, because the cycle that we are in now is on a new base line.

Q. Then I take it you did not attempt to make any table of the rate of growth in these municipalities during past years?

A. No; not individually.

Q. Did you prepare estimates for municipalities for 1950 by individual municipalities?

A. Yes. I think we projected this data that I read to you forward from '47 to '50, by individual municipalities, and then '55, '58, '60, and '70, on the same basis.

Q. In preparing your study, did you make a table of the rate of growth of these municipalities for past years by a group?

A. No.

Q. Neither by municipalities nor by a group?

A. We didn't take any class by groups or by individuals. [2667] The composite, starting with that base line, we projected this forward to get this estimate of the forecast.

Q. Do you have the figures convenient where you can give us the 1950 figures for these municipalities?

A. No. I can give you the 1955, I think.

Q. You said in order to check it, we would need the 1950. You said you started with 1950. Do you have those figures here?

A. No; I don't have them. The information I have is our base on which we started, which is either '47 or '49, as the cases might be, and we projected them forward. As I said, '50 was 8 percent, '51 and '52 7 percent compounded, and '53 on up, 6 percent per annum compounded to 1970.

We did do this on the five cities of Greenville, Rocky Mount, Wilson, Kinston, and Danville, where we had a reported 1947 energy and we also had a reported 1949 load.

Q. For that one town?

A. No; for that group of five towns. We projected forward these ratios—I was in error when I said we just took that one point—for these five towns, we projected it back between '47 and '49, determined the ratio of growth from '47 to '58——

Q. You do have the 1949 figures, then?

A. We have the reported 1949 load for these cities of Greenville, Rocky Mount, Wilson, Kinston, and Danville.

[2668] Q. Will you give those to me? And, as I understand, those were obtained from the municipalities. You said "reports."

A. I can't say whether it was obtained from the municipalities or whether it was obtained from some records in your Commission. I don't know just what the source was. I can check that up.

Mr. HANKIN. Can you give it to him at this time?

The WITNESS. I can check on what the source of that was from the staff.

Greenville, the reported load for kilowatts in '49 was 9,000; Rocky Mount, 15,000; Wilson, 12,000; Kinston, 7,000; and Danville, 11,600.

By Mr. GATCHELL:

Q. That was for 1949?

A. That is the reported 1949 load for kilowatts.

Q. When you started with a base figure for 1947, how did you get your 1950 figure? Did you use 8 percent per year?

A. We took 8 percent on top of the 1949.

Q. But for some of them you had 1947.

A. We had to project them forward.

[2669] Q. And then compounded it every year?

A. No. As I recall it, we took 8 percent up to '50, and the compounding started after '50, with the two different rates. '51 and '52 were compounded at 7 percent, and from '53 on we dropped back to 6 percent. Or, another way to put it: We have used the factor of 2¼.

Q. You do not have, do you—and I am just trying to get the figure; you may have given it to me, and I have no desire to ask for something a second time—do you have the annual peak load in kilowatts for any year other than 1947, except for these five communities?

A. No, I don't think so, and I am not so sure that that wording is annual peak load. '47 is all that I have.

Q. Do you have any estimates of their annual peak load?

A. We have estimated the 1947 load in the case of the Virginia municipalities and the same thing for Carolina, from the reported energy in '47.

Q. And you do not have it for '48 or '49?

A. No.

[2670] Q. You did not have the associated annual energy consumption by these municipalities during '48 or '49, did you? You have it some energy for '47?

A. That's all.

Q. That's all?

A. That's all, except those five special cities that I have given you there.

Q. Which were for 1949?

A. That's right.

* * * * *

[2680] Q. If I may resume the consideration of Exhibit 85 for a minute. According to your testimony regarding the loads for the North Carolina municipalities, you had actual energy loads for 1947 for each of the municipalities. Did any of that data come from the Directory of Electric and Gas Utilities in the United States, published by the Federal Power Commission in 1948?

A. I don't know. I would have to check with the staff. I wouldn't be surprised if some of it may have come from there.

Q. You, personally, did not consult that directory?

A. I, personally, did not do this job. This job was prepared by a staff under my direction.

I shouldn't say I have never consulted that directory. If that is the latest copy, I have looked at the latest copy of that directory a good many times in the last two or three months, for various information.

Q. I was looking merely to the preparation of Exhibit 85, and if you did not personally consult it in that connection or do not know that it was consulted in that connection, that is all I want to know.

[2681] A. I don't know.

Q. In making your estimates for the 1947 peak loads for each of the North Carolina municipalities;

for the 1950 loads, it would be, for each of the North Carolina municipalities from the 1947 annual energy figures, or did you do it that way? Did you make a 1947 peak load from the '47 annual figures.

A. The staff, in preparing this, estimated the annual load factor, and from the reported energy determined an estimated load for 1947, and then projected that forward, as I stated before, at a rate of——

Q. You gave us the rates. I am just getting to some specific questions.

Did you use a different load factor for each municipal system?

A. I think there may have been some variations, some slight variations of load factor in some of these cases.

Q. Can you give us those variations?

A. I can't give you that; I don't know.

Q. By slight, what do you mean?

A. Generally, these load factors would range from 35 to 47 or 48 percent annually.

Q. Can you give us any of them that operate on a 35 percent load factor?

A. That operate on a 35 percent load factor?

[2682] Q. As you prepared your estimates?

A. I could go through and make the calculation and determine what those load factors would be.

Q. You would have to go back and make the calculation?

A. That's right.

Q. If you don't have it, Mr. Creim, that is all right.

A. I don't have it.

Q. What percentage of the energy sales in 1947 by these North Carolina municipalities was to rural customers, if you used it in your calculations?

A. Of the municipalities?

Q. Of these North Carolina municipalities, the ones that you used.

A. I don't know what percentage of these sales in '47 or any other year the North Carolina municipalities made to serving REA cooperatives.

Q. Do you know what the percentage was to residential and domestic customers by these North Carolina municipalities?

A. No.

Q. Do you know what the percentage was to commercial customers.

A. No.

Q. Do you know what the percentage was to industrial customers?

A. No, we didn't go into that detail.

[2683] Q. And now you have in the 1955 column, 134,000 kilowatts for the North Carolina municipalities. Can you give us for each municipality on the list, the 1955 estimated load in kilowatts that make up that total? Do you have that?

A. Yes. For '55?

Q. Yes, sir.

A. Yes.

Q. Would you read that off to us, please? And, if you have the energy, we would like that.

A. Just the estimated load in kilowatts.

Q. You did not estimate the energy for '55?

A. No.

Q. Did you estimate the energy for '58 or 1960?

A. No.

Q. Or 1970?

A. No. No energy estimates were made at all.

Q. Did you estimate the energy in total for the whole group?

A. No.

Q. For any of those years?

A. No.

Q. Will you give us the estimated load for '55 for each of these municipalities?

A. North Carolina?

Q. Yes, sir; just the North Carolina municipalities.

[2684] A. You just want me to mention the numbers in the same order in which I gave them before, or do you want me to mention the names of the city?

Q. I think it would be less confusing if you would give us at least the name, and then the number, so that we can follow the list which you gave us yesterday. That is all I want.

A. I say, if you have the list I gave you yesterday, I can just read another column.

Q. That is on page 2601 of yesterday's transcript. The first one you have is University of North Carolina.

A. That's right. University of North Carolina, 7600; Apex, 600; Laurinburg, 1800; Red Springs, 900; Sundaburton, 4200.

Q. While we are there, Mr. Creim, it is spelled S-u-n-d-a-b-u-r-t-o-n on page 2601, line 15, and it should be as you have just given it?

A. My piece of paper here says S-u-n-d-b-e-r-t-o-n.

Q. All right, now, Wake Forest.

A. Wake Forest, 900; Louisburg, 1200; Benson, 800; Fayetteville, 15,500; Scotland Neck, 2100; [2685] Enfield, 900; Windsor, 800; Rocky Mount, 22,000; Tarboro, 3900; Wilson, 17,700; Farmville, 1700; Greenville, 13,200; Washington, 5900; Grimesland, 300; New Bern, 7200; Belhaven, 1500; Smithfield, 1800; Selma, 900; Fremont, 600; Pikeville, 200; LaGrange, 300; Kinston, 10,400; Elizabeth City, 7000; Hertford, 800; Edenton, 1700.

Q. In preparing Exhibit 85, have you used the annual power system statements filed by these North Carolina municipalities with the Federal Power Commission?

A. I don't know whether the staff did, or not; I think they did, in part, from time to time.

[2686] Q. You couldn't tell us what part they did use?

A. No; I don't know.

Q. And you don't know whether they used any of the load estimates made by those municipalities in these power system statements?

A. Well, I know that they did, in part, particularly in the discussion with the five municipalities in North Carolina that I mentioned yesterday. I wasn't present at the conversations between the engineers and superintendents of those municipalities, with the staff.

Q. But you think that as to those five North Carolina municipalities you referred to yesterday, they probably did use the estimates by the municipalities themselves, as reported in the FPC power system reports?

A. No. Well, as to what they reported in 1947, they may have.

Q. That would not be an estimate, would it?

A. No, that would not be an estimate.

Let me say it this way: Consideration may have been given by staff in determining these percentages to apply to the reported loads in 1947. If the figures that I have quoted here are the same as the estimates of the municipalities, it would be a coincidence.

Q. And not intentional?

A. Not intentional.

[2687] Q. Because you made your own estimates for '55 and subsequent years?

A. This entire group of conclusions that we have drawn here comes from that formula that I repeated yesterday, the only variation in the formula being as to the starting point. We endeavored to gather together the best information we have in our files, plus what was available here in Washington, readily available.

Q. By "in Washington," what do you mean?

A. I am reasonably sure that some consultation on the part of our staff was made with the FPC records downstairs. I know they have been coming over here, somebody has been over here almost every day for several months, looking at the annual reports for this information and that information, not only on these loads but other information.

I don't want to give the impression that these estimates reflect the views and viewpoints of anybody in North Carolina and Virginia. They represent the viewpoints of Southeastern as a load that we can

reasonably expect, that Southeastern can reasonably be expected to ask to serve. In other words, we went through this operation for one purpose—and it is a quickie, not any detailed, elaborate load forecast going into all of the details that you have asked about previously. The purpose of this study was to give to me, as Administrator, a quick estimate as to what the probability of the preference [2688] agency power market in the Roanoke River basin area will be from now until about 1970, so that I could use it as a measure of the requirements of preference agencies, and what they, in our judgment, would be coming to our office and asking for in the way of power service.

Q. When was that study started, and when was it completed?

A. This particular tabulation was gotten together and completed here in the last two or three weeks, I would say just in preparation for this particular hearing. We have been working on this data ever since Southeastern got started, and a lot of it was in the files of the Division of Power previously.

Q. Did you use any estimates of population for any of these municipalities?

A. No. We didn't use any specific population growth for a particular city.

Q. Did you use it for the group?

A. No.

Q. Did you use it for the area?

A. No. We used, basically, as I stated before—and I will repeat it here—we came up with this over-all factor——

Q. I am just asking the specific question. You have answered my question, and I am entitled to have you stop when you have answered.

[2689] A. All right.

Q. How many rural customers were served by these North Carolina municipalities in 1947, if you know?

A. I don't know.

Q. Do you know what the average annual use of any of the municipal customers was in 1947?

A. No.

Q. Have you made any estimate of the rural customers that you expect these municipalities to serve in 1955, or any other year?

A. No.

Q. Have you made any estimate of the annual use per rural customer that you expect these municipalities to serve in 1955 or any other year?

A. No.

Q. Did you make any estimate of the average use by residential and domestic customers which you expect to be served by these municipalities in 1955 or any subsequent year?

A. No. All of these answers "No" apply to this particular study.

Q. That is what I am dealing with, Exhibit 85.

A. I have general knowledge of the subject you are talking about but, specifically with reference to this exhibit, No.

Q. Would the same answer be given with respect to the [2690] anticipated use by commercial customers to be served by these North Carolina municipalities in 1955?

A. The same answer.

Q. Would the same answer be given with respect to industrial customers?

A. The same answer.

Q. And you do not know how much energy was supplied by these municipalities to industrial customers in 1947?

A. I said "No."

Q. How much of the energy that was supplied by these North Carolina muncipalities during 1947 was used by other departments of the municipal government?

A. I don't know as to that.

Q. You do not know?

A. No.

Q. You don't know what use they made of it?

A. No.

Mr. HANKIN. Mr. Examiner, may I interpose an objection at this point. This has been going on for a long time. Once the load requirement is there, so far as Southeastern is concerned it doesn't make any difference how much energy they sell to one person, Mr. Smith, Mr. Jones, and so on. It has no relevancy and has no relation to the direct testimony given.

I would, therefore, like to ask that this should not be prolonged any further.

[2691] CHIEF PRESIDING EXAMINER. I think the examination is proper. I will have to overrule the objection.

By Mr. GATCHELL:

Q. Have you made any study to determine what percentage of the total system energy of these North

Carolina municipalities consisted of transmission and distribution losses and energy unaccounted for in 1947?

A. We did not.

Q. Did you make any estimate of the percentage of losses that were estimated for 1955 or any subsequent year?

A. We did not. Let me interpose here. These studies were not made for that purpose, and that is why I have to answer "No."

Q. All right. I am just merely asking specific questions.

What amount of annual energy did you associate with the 1958 load for these North Carolina municipalities of 160,000 kw.?

A. We didn't associate any, we didn't go that far in our studies.

Q. Nor did you do that for 1960 or 1970?

A. None of the years.

Q. Can you tell us to which of the municipalities on your list as making up this group of North Carolina municipalities on Exhibit 85, would it be economical to transmit power?

A. Which ones?

[2692] Q. Yes, sir.

A. Very specifically, it is my judgment that it is quite economical to transmit power to this group of larger cities.

Q. Perhaps you better name those, if you will.

A. I was just going to. This group of Greenville, Rocky Mount, Wilson, Kinston, and Danville. We haven't completed any studies on it, but it is my judg-

ment, on the basis of my experience, that it would be quite economical to transmit Buggs Island power to that area, and that comprises, perhaps, starting with the first of those communities, about 60 miles from Buggs Island, as I recall it, and then perhaps there is a 60-mile circle south of there. Some of these municipalities are farther away, but for that particular group, there just isn't any question in my mind about it.

Q. Any others?

A. I haven't given much consideration to the others up to this time. One bearing on that is the question of—not only the municipalities, I wouldn't consider transmission to the municipalities by themselves, because we have——

Q. I am not asking you to explain why you have not; I am merely asking you what you have done.

A. I will let the answer stand.

* * * * *

[2695] By Mr. GATCHELL:

Q. In preparing Exhibit 85, Mr. Creim, did you use monthly peaks of the North Carolina municipalities, either individually or as a group, in preparing the estimates for 1955 or any other year?

A. I don't think they did; I don't know.

Q. Do you know what the monthly peaks of these municipalities are in percent of the annual peaks?

A. No, I don't.

Q. The third item on here is the Virginia municipalities for which you give 58,000 kw. as their estimated loads for 1955. Do you have the breakdown

on that similar to the breakdown you gave us for the North Carolina municipalities?

A. Yes, sir; I have.

Q. Will you give it to us, please?

* * * * * * *

A. Right.

Bedford, 6,000; Blackstone, 2,400; Culpepper, 1,500; Danville, 18,500; [2696] Franklin, 2,400; Harrisonburg, 8,100; Martinsville, 6,400; Radford, 6,600; Salem, 2,700; Virginia Polytechnic, 3,600. That is Virginia Polytechnic Institute.

* * * * * *

By Mr. GATCHELL:

Q. As I understand it, you do not have the energy requirements for any of these years, 1955 or any later year?

A. No, sir; and if I may be permitted to simplify things, my answers with reference to the Virginia municipalities would be just what they were for the Carolina municipalities.

Q. With respect to the classes of customers?

[2697] A. The classes of customers and all of these previous questions you have asked about the specific details. I don't have it.

Q. I was going to ask you that general question, and that is the answer?

A. That is the answer.

Q. Thank you.

I presume the answer would be the same with respect to the use of the Directory of Electric and Gas Utilities of the FPC?

A. Yes, sir. The same general questions for North Carolina apply to Virginia.

Q. Now, will you turn to the Old Dominion Electric Cooperative, which is the fourth group on Exhibit 85? I understand that you dealt with that cooperative as representing a group of member cooperatives, but I would like to know, just so that we may not be talking about two different things, whether you are using the same group, the same members of that Old Dominion Electric Cooperative as have been used previously in this proceeding, if you know?

A. As to that detail I cannot enlighten you. Our conversations have all been with the staff and the officers of the Old Dominion Electric Cooperative. That is the federated group. I don't have the information here as to just what specific individual REA cooperatives are members of that at [2698] this moment.

Q. We will assume, unless you advise us to the contrary, that they are the same members as those referred to here.

A. I think it would be a fair assumption.

Q. I think so, too. I just want to be sure about it.

I take it from that comment that you do not have, for any of those member cooperatives, any figures for the annual load or annual peaks during 1947 or any other year?

A. I don't have them here. They are available in a report published by the Rural Electrification Administration. They publish annually a report giving most of that statistical data.

Q. Was that report used in preparing your figure of 36,350 kw. as to capacity, as shown on Exhibit 85?

A. It was used in part for part of the 36,350, because part of that 36,350, as indicated by footnote 2, includes the steam plant that Old Dominion is now proposing to build.

Q. Yes, but the balance of it would be what you used the report for?

A. The remaining information on the existing smaller plants in that area was obtained from the REA, and whether it was from this particular report that I referred to, or not, I don't know.

Q. Do you have in your papers there the annual load for the whole group of Old Dominion Electric Cooperatives?

[2699] A. At the present time?

Q. At the present time.

A. No; I don't have that.

Q. Do you know whether that——

A. Wait a minute. Let me look, now.

No, I don't have that.

Q. Was that used in preparing Exhibit 85; do you know?

A. When you say "that"——

Q. I mean the annual load of the Old Dominion Electric Cooperative group.

A. Both the Old Dominion and the Eastern North Carolina estimates for '55, '58—'55 up to '58, at least, the projection beyond that is ours. We are in agreement with the estimates that were made by the engineers for those two organizations, and the projection into the sixties and seventies is per our own formula.

We did not make a detailed analysis of the individual REA cooperatives that go to make up this com-

posite unit, and in preparing this exhibit, we have not gone back to all of the detail.

Q. But these figures that you give for 1955 and 1958 are your figures, and they are merely substantiated by the REA engineers' estimates themselves; is that right?

A. I believe that is correct.

Q. Did you use any diversity factor in projecting your [2700] estimate to 1955?

A. In projecting it up to '55?

Q. Yes, sir.

A. The information I have is that the same formula was used for the Old Dominion, for these REA cooperatives, that was used for the municipalities. They took the first base line they could get hold of and projected it forward.

Q. What diversity factor did you use? You gave us the 35 to 47 per cent load factor.

A. Are you talking about load factor or diversity factor?

Q. 35 to 47 per cent load factor for the North Carolina municipalities. Did you have a diversity factor that you can give us for those municipalities?

A. We didn't consider diversity factor at all.

Q. Did you consider the diversity factor for the Old Dominion Electric Cooperative?

A. We did not; not diversity factor.

Q. That is what I wanted.

A. No.

Q. I presume that you do not have any figures with reference to the customer use of these member

cooperatives of the Old Dominion Electric Cooperative, do you?

A. Well, I don't have it here. I think we have some information on it in the office.

[2701] Q. Did you use that member use?

A. No. We did not use the individual member use.

Q. You don't know how many customers were served by these cooperatives for the purpose of preparing Exhibit 85?

A. No; not specifically.

Q. You don't know how many of those customers were rural customers, or residential or commercial customers?

A. Well, they were customers of the REA and we didn't endeavor to break them down into these other categories.

Q. Into classes of service, you did not?

A. No.

Q. Did you make any study of the percentage of energy losses with respect to the total energy?

A. We did not.

Q. Do you have the energy figures for the years 1955 or any of the subsequent years for this Old Dominion?

A. No.

Q. Did you attempt to make any estimate as to how many customers the Old Dominion Cooperative would be serving in 1955?

A. We didn't make any attempt to estimate that, but I think we have the information on their estimate.

Q. I am merely asking how you prepared Exhibit 85.

A. We didn't make any estimate.

Q. Did you make any population estimates?

[2702] A. No.

Q. Do you know what percentage of farms in Virginia had central station service in 1947 or 1949, whatever the year was?

A. Specifically, I don't know.

Q. Did you use that in preparing any of your estimates for 1955 or subsequent years?

A. No; we did not.

Q. Does the amount of electric energy used on a farm in Virginia depend upon the type of that farm?

A. Yes.

Q. Do you know what percentage of the farms in Virginia are fruit and nut farms?

A. No.

* * * * *

[2703] By Mr. GATCHELL:

Q. Mr. Creim, do you know what percentage of the farms of Virginia are vegetable farms?

A. No.

* * * * *

Q. Mr. Creim, do you know the percentage of the farms in Virginia that are devoted to any other major purpose?

[2704] A. To simplify this, I know virtually nothing about the detailed agricultural statistics of the State of Virginia.

Q. That is fine. That will answer several other questions which I have.

Would your answers with respect to the Eastern North Carolina EMC be the same as those given with

respect to the Old Dominion Electric Cooperative, with respect to the classes of customers and the types of customers served, and so on?

A. As to agricultural statistics, yes, the answers would be the same.

Q. Can you give us the names of those Eastern North Carolina EMC cooperatives that are in this group?

A. No; I can't.

Q. Our difficulty arises, Mr. Creim, because we think we have one list, and we think you have used another. Is there any way that you could give us that list?

A. I could probably write and get it for you.

Q. That would be too late.

A. I don't know what list you have, or where you got it, but this Eastern North Carolina cooperative at the moment is not in the same state of development as is the Old Dominion.

You will recall that in my testimony yesterday, I said this group of Eastern North Carolina Cooperatives does not include all of the cooperatives in the State.

Q. I understood that, and that is what caused our [2705] difficulty.

A. Yes.

Q. Would it be possible to get from the REA office here the information which would enable you to give us that list?

A. I don't know whether I could get it here.

Q. We certainly have no way at all of checking your fifth group on there, unless we know what cooperatives you have used for that tabulation.

A. You want their names?

Q. I would like their names, and if you have any statistics such as you have given us for the North Carolina municipalities and the Virginia municipalities, similar to that, I would appreciate that.

* * * * *

[2706] By Mr. GATCHELL:

Q. Did you use, in connection with these Eastern North Carolina EMC's, any diversity factor to determine the estimated load for 1955?

A. No.

Q. And I take it you did not use the annual energy?

A. That's correct; I did not.

Q. Have you made any study in preparing Exhibit 85, to determine the present saturation of any of the electric equipment that would be used on any of the farms in either Virginia or North Carolina, to be served by any of these cooperatives or municipalities?

A. I did not.

Q. Was a month by month load study made of each group [2707] shown on Exhibit 85 to determine the seasonal characteristics of the group loads?

A. That has not been made.

Q. Have you made any study to determine during what month in the year the peak would occur on any one of these groups?

A. That has not been made yet.

Q. Could you tell us in what month the peak occurred in any one of these groups during the years of actual record that you used, 1947 or '49?

A. No, I can't.

Q. Do you know when the peak load occurs on the Federal agencies?

A. I only have an idea, and I would prefer not to express it. I don't know specifically.

Q. Would you know with respect to the time during the day when it occurs? Is it the morning, afternoon, or evening?

A. Most of these Federal agencies—there may be an exception—but most of the Federal agencies fall into two categories: Those of the production and maintenance category, for example the St. Helena Repair Shop and the Naval Shipyard. It is my judgment that their peak is a daytime peak; in other words, some time between 8:00 and 5:00, because they are on single shift operation.

The other activities here that are of the nature of [2708] defense stations in which domestic load and station load is probably the predominant use, that would occur right after sunset, but I can't tell you specifically with reference to any one.

Q. Have you made any attempt to determine whether there would be any diversity between the time of occurrence of the peaks in these five groups?

A. We haven't done that as yet.

Q. Would that be true with respect to the month of annual peak for these five groups?

A. Both as to within the day and within the month and within the period of a year.

Q. Do you have anything in writing from any of the Federal agencies that you listed, or the North Carolina municipalities, or the Virginia municipalities, or the cooperative members in the Old Dominion

Electric Cooperative, or the Eastern North Carolina Electric Cooperative, saying that they do not propose to install generating facilities in the future, in addition to the generating facilities you have shown on Exhibit 85?

A. Saying they do not propose to install?

Q. Yes, sir.

* * * * *

Q. Do you have anything in writing to the effect that the Federal agencies, the North Carolina municipalities, the Virginia municipalities, the Old Dominion REA Cooperative, or the Eastern North Carolina EMC group, will not install generating facilities in the future, in addition to the generating [2711] capacity shown on Exhibit 85?

A. I don't know of any such information in the files.

Q. Now, will you turn to Exhibit 86, please?

A. Yes, sir.

* * * * *

[2787] Redirect examination by Mr. HANKIN:

Q. Mr. Creim, you were asked by Mr. Moore whether it was not the responsibility of the Chief of Engineers to request funds from Congress for the construction of the ultimate units in the Buggs Island project. Do you consider that there are [2788] any conflicts between your responsibilities and the responsibilities of the Chief of Engineers?

A. No. On the contrary, we have correlative responsibilities and it is to be expected that both the Chief of Engineers and we of Southeastern will carry out the laws of the Congress.

Q. Referring to your testimony on page 2629, line 2, through 2630, line 16, respecting the responsibility of the Corps of Engineers to plan and to construct such projects as Roanoke Rapids, and to make recommendations for the appropriation of funds for additional generating facilities, do you not feel that you have a particular and definite responsibility as the marketing agency to inform the Corps of Engineers as to the actual status of the market for power and its relation to the need for new projects?

A. Yes; I definitely feel that it is my responsibility, and I fully intend to keep all of the District and Division Engineers of the Southeastern area of the Corps advised as to our marketing operations. It is my judgment that there cannot be intelligent planning for the future without the Corps of Engineers being in possession of this basic information on as current a basis as is possible.

* * * * *

[2789] Q. You were asked whether, in the compilation of the figures you gave concerning the requirements of municipalities, you had consulted the Federal Power Commission Directory of Electric and Gas Utilities—I believe that is the name of the directory. Your answer was that you did not know. I understood the question, when it was asked you, meant you or your staff. Have you since then ascertained whether that was done?

A. Yes. The Federal Power Commission figures were used, except in specific instances where more direct and more recent information was available.

Q. Referring to page 2605, line 6, of the transcript, do you have—I believe that is the question he asked about Lumberton?

A. No.

Q. Line 6; do you have a correction you want to make in the record?

A. Yes; I have. On page 2605, line 6, the number "1970" [2790] should read "1958."

* * * * * *

By Mr. HANKIN:

Q. * * * Mr. Gatchell asked you a number of questions concerning the customers of your prospective preference customers; namely, how many of them were rural customers, how many were residential, how many industrial, and also what would be the diversity factor of the various preference customer loads. I believe you answered that you did not know, or that you did not have that information available. If you did have that information available to the minutest detail, would that make any substantial difference in your estimates of the load requirements for the various years shown in Exhibit 85?

A. Conclusions drawn would be substantially the same. In my 30 years of experience as a professional engineer, containing no small amount of work in load studies and load forecasts, it has been my observation that the studies based on extreme minutiae more than often not go wide of the mark and historically are no better than estimates made on a broad envelope curve principle by engineers of experience, or if you wish, you may refer to it as educated estimating.

[2791] Q. On page 2708 of the transcript you were asked whether you had anything in writing from any Federal agencies, North Carolina municipalities, Virginia municipalities, or the cooperatives, which are members in the Old Dominion Electric Cooperative or the Eastern North Carolina Cooperative, stating that they do not propose to install additional generating facilities; that is to say, in addition to those shown on Exhibit 85.

My question to you is: Was there any occasion which would call for such a statement from the agencies mentioned in the question asked you by Mr. Gatchell?

A. None whatever.

Q. And is that the reason why you never received any such written statements from them?

A. I imagine so.

Q. Have you received any inquiries for power from Buggs Island and Philpott?

A. Yes; we have received many inquiries, both verbal and written, concerning Buggs Island and Philpott power.

* * * * *

Exhibit 84

[4184]

Form SEPA–1 (4–3–50)

Budget Bureau No. 42–R981.
Approval expires—Indefinite.

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
Southeastern Power Administration
ELBERTON, GEORGIA

APPLICATION FOR POWER

_____,
(Name of organization)
a _____, existing under the laws of the State of _____ hereby applies to the Southeastern Power Administrator for reservation of _____ kilowatts of electric power.

The applicant now operates electric distribution facilities for the following counties:

The applicant purchased and/or generated a total of _____ kilowatt-hours of electric energy during the 12-month period ending _____, and its peak load during such period which occured on _____ was _____ kilowatts.

Electric power will be required by the applicant on or about _____, 19____.

The Southeastern Power Administrator is hereby requested to determine whether such service can be rendered, and if it can be rendered, to prepare a draft of a contract for submission to the undersigned.

The above application is executed in accordance with authorization given by the _____
(Name of governing body)
_____ on _____,
19____.

[SEAL] _____
(Official name of applicant)

Dated_____ By _____
(Name)

_____ (Title)

TESTIMONY OF MR. CREIM

DIRECT EXAMINATION

[2450] By Mr. HANKIN:

Q. Have you made any studies or surveys as to the availability of the preferred market for power from Buggs [2451] Island and other projects in the Roanoke River basin?

A. We are in the process of making these studies and surveys. These studies and surveys have not yet been completed; they will be completed in the reasonably near future.

Q. What do you mean by the reasonably near future?

A. Approximately four or five months from now.

Q. You would say, then, that four or five months from now would constitute a reasonably near future?

A. Yes; considering what we intend to do by way of completing this survey.

Q. What do you intend to do by way of completing this survey?

A. In addition to receiving requests for power and negotiating with various public bodies and cooperatives, we have drawn up an "Application for power" form which we intend to send to every potential preferred customer in the southeastern area. Upon receipt of such applications, we intend to enter into memoranda of understanding with each of the agencies. Immediately thereafter, we shall proceed jointly

with the applicants to draft contracts which will set forth the terms, conditions, and all other matters pertaining to the power sales.

Q. Is Exhibit 84, marked for identification, the form of application for power that you intend to send out to preferred customers?

[2452] A. It is.

Q. I take it that you have not yet sent out these applications?

A. No; we have not as yet sent them out. They will be sent out in the very near future. Under Federal procedure, an application form of this kind must be submitted to the Bureau of the Budget for approval. That has been done, and the forms are now being printed at the Government Printing Office. As soon as they are available, they will be mailed to all of the prefe ence agencies.

Q. In the meantime, have there been any negotiations which led to commitments on your part to sell power from Buggs Island?

A. Yes. We have entered into a memorandum of understanding with the Old Dominion Rural Electric Cooperative for the sale of 35,000 kilowatts of power. We are now engaged jointly with the National Advisory Committee for Aeronautics in the drafting of a memorandum of understanding for the sale of 70,000 kilowatts of on-peak and 150,000 kilowatts of off-peak power. We are also working on a draft of a memorandum of understanding with the eastern North Carolina Cooperatives for the sale of 30,000 kilowatts of power to them, a which we feel we have already committed ourselves.

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